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Regulated and Unregulated Exhaust Emissions from Malfunctioning Three-Way Catalyst Gasoline Automobiles

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San Antonio, TX

Prepared for

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Office of Mobile Source Air Pollution Control
Emission Control Technology Division
2565 Plymouth Road
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REGULATED AND UNREGULATED EXHAUST EMISSIONS FROM MALFUNCTIONING THREE-WAY CATALYST GASOLINE AUTOMOBILES

by

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Prepared for

ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise, and Radiation
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

January 1980

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ABSTRACT

This report describes the laboratory effort to characterize regulated and unregulated exhaust emissions from three-way catalyst-equipped gasoline automobiles operating under malfunction conditions. Three automobiles were evaluated over three driving schedules in the unmodified configuration and in four engine and/or emission control system malfunction configurations. Exhaust emission constituents measured, in addition to the currently regulated emissions, include: particulates, sulfates, aldehydes, sulfides, amines, metals and several additional elements and compounds. Additional evaluations, in each of the configurations, involved the measurement of regulated emissions over four short-cycle procedures.

FOREWORD

This project was initiated by the Technology Assessment and Evaluation Branch, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105. The engineering and analytical effort on which this report is based was accomplished by the Department of Emissions Research of Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas 78284. This project, authorized by Contract 68-03-2588, was initiated on August 10, 1977 and was completed September 10, 1979.

The SwRI Project Leader was Mr. Charles Urban who supervised all vehicle testing, data analyses and reporting. Mr. Harry Dietzmann was in charge of all unregulated emissions procedural development related activities that were involved in this project. Mr. Karl Springer was Project Manager and was involved in the initial technical and fiscal negotiations and all subsequent major project decisions.

The Project Officer throughout the entire project was Mr. Robert Garbe of the Technology Assessment and Evaluation Branch, Environmental Protection Agency. Mr. Garbe played an active part in all major project areas. Dr. Ronald Bradow and members of his staff, of the Environmental Protection Agency at Research Triangle Park in North Carolina, provided considerable technical and other support relative to the analyses of the unregulated emissions.

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SUMMARY

The major objective of this project was to study exhaust emissions from low-NO_x catalyst-equipped gasoline automobiles operating under malfunction conditions. These evaluations involved analyzing the exhaust for many unregulated compounds and elements in addition to the currently regulated emissions.

This study involved three 1978 model automobiles: a Ford Pinto, a Pontiac Sunbird and a Saab 99. All three of these automobiles were certified to the Federal and California emissions standards and utilized three-way catalytic converters and feed-back fuel systems. The Saab 99 had oxygen-sensor controlled continuous fuel injection while the other two automobiles utilized feed-back carburetion.

Following final selection of the malfunction conditions, each of the three automobiles was evaluated in the unmodified and in four different malfunction configurations. Malfunction conditions involving disconnected oxygen-sensor and twelve percent ignition misfire were evaluated with all three of the automobiles. Disconnected oxygen-sensor plus disabled EGR and high oil consumption were evaluated with two of the three automobiles. Disconnected oxygen sensor plus disabled air injection system and disconnected oxygen-sensor plus rich best idle were evaluated with one automobile.

Unregulated emission compounds measured included: sulfates, particulates, metals and other elements, aldehydes, cyanides, sulfides, organic amines, nickel carbonyl, n-nitrosodimethylamine, ammonia and nitrous oxide. A number of the analytical procedures for these compounds were developed specifically for use in this and several other related projects.

The three primary test sequences involved in this project were the light-duty Federal Test Procedure (FTP), the congested freeway driving schedule and the highway fuel economy driving schedule. In addition, the regulated emissions were evaluated over the New York City cycle, the federal short cycle and two steady-state procedures. The basic requirements specified in the Code of Federal Regulations for certification of light-duty vehicles were followed for the three primary test sequences and the two additional driving schedules.

A significant data base for both regulated and unregulated emissions was generated in this project. These data were analyzed to the extent applicable and are presented in several different formats to facilitate their review and usage. Highest values detected, for all cars operating under all test cycles and all malfunctions, are summarized as follows:

Emission	Emission Rate, mg/km	
	Unmodified	Malfunction
Hydrocarbons[a]	160	2150
Carbon Monoxide[a]	2600	57500
Oxides of Nitrogen[a]	520	730
Total Particulates[a]	15	29
Sulfate	7	14
Aldehydes & Ketones	3	6
Organic Sulfides	1	6
Organic Amines	<0.1	<0.1
Ammonia	61	318
Cyanides & Cyanogen	1	67
Hydrogen Sulfide	<1	7
Nickel Carbonyl	0.00	0.00
Nitrous Oxide	18	79

[a] Values for the FTP are given for the three regulated emissions and total particulates. For HC, CO and total particulates, the FTP values were the maximum values.

I. INTRODUCTION

This report describes the effort to characterize regulated and unregulated exhaust emissions from three-way catalyst-equipped gasoline automobiles operating in the unmodified and under malfunction conditions. This is the second project to be completed from among several related projects at SwRI involving the evaluation of a large number of unregulated emissions from gasoline automobiles. The initial project involved evaluation of non-catalyst and oxidation catalyst-equipped gasoline automobiles.(1)*

A. Project Objective

The major objective of this project was to evaluate the effects of engine malfunction conditions on exhaust emissions from low-NO_x catalyst-equipped automobiles. Emissions evaluated included the three currently regulated emissions (HC, CO and NO_x) along with a significant number of currently unregulated compounds (e.g., sulfates, sulfides, aldehydes, amines, etc.).

B. Emissions Measurement Procedures

The emissions measurement procedures utilized in this project ranged from those procedures routinely used (HC, CO, NO_x, sulfate, etc.) to procedures that required considerable research and experimentation before they became operational (organic sulfides, amines, etc.). The compounds or compound groups evaluated, along with the sampling method used, were as follows:

Sampling Method	Compounds Evaluated
Bag	HC, CO, NO_x, CO_2, Individual HC, Nitrous Oxide and Nickel Carbonyl
Filter	Sulfates, Particulates, Metals and other Elements
Impinger	Cyanides, Aldehydes, Hydrogen Sulfide, Ammonia and Organic Amines
Trap	Carbonyl and Organic Sulfides and DMNA

* Superscript numbers in parentheses designate references at end of report

A number of the procedures for measuring unregulated emissions were developed in another project and reported in a widely distributed interim report.[2]

C. Vehicles Evaluated

Three automobiles were utilized in this project. Included were a 1978 Saab, a 1978 Ford Pinto and a 1978 Pontiac Sunbird; all of which had a three-way catalyst and were certified for sale in California. The Saab has an oxygen-sensor regulated continuous fuel injection system. The Pinto and the Sunbird had feed-back carburetors and also had EGR. The catalytic converter on the Pinto consisted of a three-way catalyst followed by an oxidation catalyst, with additional air introduced between the catalysts.

D. Malfunction Conditions Evaluated

Potential malfunction conditions for this project were identified from the service manuals, discussions with representatives from the respective manufacturers and the previous malfunction project.[1] A series of tests were then conducted using the 1978 Pontiac Sunbird to identify the "best" malfunction candidates for use in this project. Conditions considered were: disconnected oxygen-sensor, maximum rich operation, rich best idle, engine misfire, EGR failure, air pump failure, high oil consumption, extreme lean operation and various combinations. Leaded fuel operation was a condition of concern; but was not chosen for consideration due to lack of emission measurement methods for halogen compounds at the time this project was initiated. All of the preceding candidate malfunction conditions were evaluated in either the malfunction screening or the vehicle testing phases of this project.

E. Vehicle Testing

Each of the three automobiles was tested in the unmodified configuration (i.e., tuned-up to manufacturer's specifications) and in each of four malfunction conditions. The test sequences included the Light-Duty Federal Test Procedure (FTP),[3] the Congested Freeway Driving Schedule (SET),[4] and the Highway Fuel Economy Driving Schedule (HFET).[5] Preconditioning of the vehicle prior to testing was conducted in accordance with the 55 mph Alternate Mileage Accumulation Procedure.[6] To the extent practical, all specified unregulated exhaust constituents were sampled and analyzed during every test. In addition, the regulated emissions were measured in each configuration using four short-test procedures.

II. GENERAL EQUIPMENT, INSTRUMENTS, PREPARATIONS AND PROCEDURES

This section describes the vehicles, the fuel and lubricant, the facilities and the general instrumentation and procedures utilized in this project. The overall sampling systems for the unregulated emissions are also discussed.

A. Vehicles

Three new gasoline-powered automobiles were evaluated in this project. These automobiles (cars) are described in Table 1 and are shown in Figure 1. All three of the cars were provided by the respective manufacturers and came equipped with the normally obtained options, such as automatic transmission and steel-belted radial tires. These cars came equipped with the standard rear-axle ratio and standard size tires. The Saab 99 had front-wheel drive.

B. Fuel and Lubricant

Throughout this project a single batch of Chevron UL-CQ26B1 unleaded gasoline, type provided to auto manufacturers for emissions durability tests, was used for all testing. This gasoline, described in Table 2, was made in accordance with the specifications outlined MSAPC in Advisory Circular No. A/C 26B1 and contained no measurable manganese. The hydrogen to carbon ratio was 1.89 and the SwRI identification number was EM-344.

The engine lubricant used throughout this project was Exxon Uniflow 10W40 motor oil. This motor oil, in addition to having a significant sales volume, contained an additive for reducing engine friction. Indications at the time this motor oil was initially selected were that many or most motor oil manufacturers were planning to incorporate friction additives into their motor oils.

C. Dynamometer and CVS System

A Clayton Model ECE-50 chassis dynamometer with a belt-driven variable-inertia flywheel system, was utilized for all transient testing. The belt-driven inertia system simulates equivalent weight of vehicles from 680 kg (1500 lbs) to 2495 kg (5500 lbs) in 115 kg (250 lb) increments to 1360 kg and 225 kg increments about 1360 kg.

The constant volume sampler (CVS) used for these evaluations was SwRI CVS Number 2. This unit has a nominal capacity of 9.2 m^3/min (325 cfm). A nominal 460 mm (18 inch) diameter by 5 m (16 feet) long dilution tunnel was used between the intake filter and the CVS to enable sampling of sulfates and particulates.

TABLE 1. AUTOMOBILES EVALUATED UNDER CONTRACT NO. 68-03-2588

Project Car Number	Vehicle					
	Year	Make	Model	Body Type	ID or Serial Number	GVWR, Kg
41	1978	Ford	Pinto	2-dr	8R10Y131365	1552
42	1978	Pontiac	Sunbird	Hatchback	2M0718U550559	1720
43	1978	Saab	99	2-dr	99781011503	1728

Project Car Number	Engine		Emission Controls		
	CID/Cyl	Family	Catalyst	Air Pump	EGR
41	140/4	2.3"B (ITR80XR80)	3-way + oxi.[a]	Yes	Yes
42	151/4	820X6EU8BEV	3-way	No	Yes
43	121/4	B120CA	3-way	No	No

Project Car Number	Fuel Control System		Chassis Dynamometer Settings[b]	
	Fuel Control	Oxygen Sensor	Inertia, kg (lbs.)	Power, kw (hp)[c]
41	Feed-back carb.	Yes	1250(2750)	8.0(10.7)
42	Feed-back Carb.	Yes	1360(3000)	6.7(9.0)
43	Continuous Inj.	Yes	1360(3000)	8.4(11.3)

Note: All three automobiles were equipped with:

Automatic Transmission

Air Conditioning

Steel-Belted Radial Tires

---

[a] Three-way catalyst followed by an oxidation catalyst.

[b] Same as settings used in EPA certification of each automobile.

[c] Includes the increase for air conditioning.

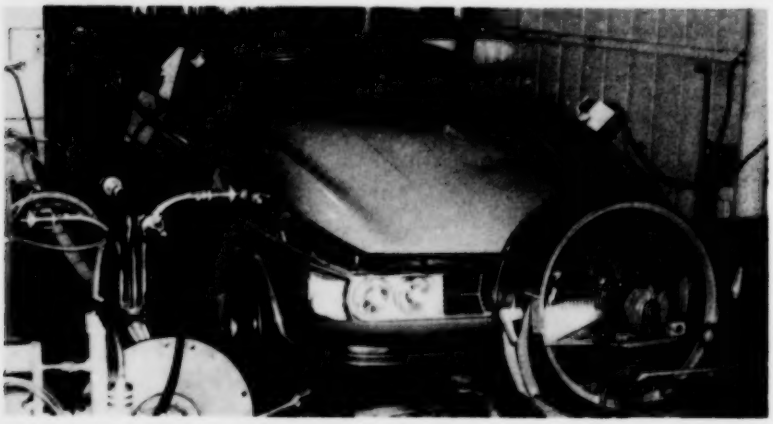
TABLE 2. DESCRIPTION OF CHEVRON UL-CQ26B1 UNLEADED GASOLINE

	Test Method	
Availability Date		April 24, 1978
Tank No.		94
Gallons		801,901
Gravity, °API at 60°F	ASTM D 1298	58.4
Research Octane No.	ASTM D 2699	91.6
Motor Octane No.	ASTM D 2700	83.2
Sensitivity		8.4
Lead, g/Gal.	ASTM D 3237	0.001
Sulfur, Wt %	X-Ray - ASTM D 2622 (Modified)	0.029
Phosphorus, g/Gal.	ASTM D 3221	0.0002
Manganese, g/Gal.	EAM 128-74	0.001
Gum, mg/100 mℓ	ASTM D 381	
Unwashed		85
Washed		0
Reid Vapor Pressure, psi	ASTM D 323	8.9
Distillation, °F (% Evaporated)	ASTM D 86	
IBP		97
10%		129
50%		212
90%		328
EP		386
Recovery, %		97.5
Residue, %		1.0
Loss, %		1.5
Acidity of Residue	ASTM D 1093	Pass
Hydrocarbons, Vol %	ASTM D 1319	
Aromatics		28
Olefins		8
Saturates		64
Benzene, Vol %	Chevron Research Technique	2.0
Water and Sediment, Vol %	ASTM D 2709	<0.001
Oxidation Stability, Hr	ASTM D 525	24+
Copper Corrosion	ASTM D 130	1A

Note: These inspection data were provided by the Chevron Research Company.

Car 41 - 1978 Ford Pinto

Car 42 - 1978 Pontiac Sunbird



Car 43 - 1978 Saab 99

Figure 1. Three-way catalyst equipped cars evaluated.

Partial views of the chassis dynamometer and the intake and dilution tunnel to the CVS can be seen in previous Figure 1 and subsequent Figure 3. Both the dynamometer and the CVS were calibrated, maintained and operated in accordance with the manufacturer's instructions and the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.[3]

In addition to the 142 m^3/min (5000 cfm) cooling fan placed in front of the automobiles, 42 m^3/min (1500 cfm) blowers were available to cool each rear wheel and to blow the heat from the exhaust pipe away from the automobiles gasoline tank. These additional blowers were used only during the SET and HFET driving cycles.

D. Exhaust Sampling and Analysis

A pictorial schematic of the exhaust and sampling system is shown in Figure 2. This system is in accordance with the guidelines established in various projects conducted at SwRI for the EPA. The major difference between this system and similar systems used in other projects is the number of sampling probes and systems required to collect all of the required unregulated emission samples. This is illustrated in the several views of the system shown in Figure 3. View A shows an overall view of the entire system in operation during an actual test. View B shows the system used to continuously record the dilute HC, CO, NO_x, and CO_2, the O_2 in raw exhaust, and the catalyst temperature. View C shows a significant portion of the sampling systems for the unregulated emissions. View D provides another view of the overall set-up with operators in place as required to operate all of the sampling systems.

This section has described the dilution tunnel and provided some insight into the overall sampling system assembly. More details on each of the individual sampling systems for the unregulated emissions are given in Section III of this final report.

E. Instrumentation for Regulated Emissions and Engine Parameters

Bagged samples of the dilute exhaust were evaluated for HC, CO, NO_x, and CO_2 using SwRI Bag Cart Number 1. This bag cart was designed, calibrated and operated in accordance with the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.[3]

In addition, the levels of dilute HC, CO, NO_x and CO_2 were recorded continuously on a strip chart recorder. These dilute emissions are automatically engine exhaust flow-weighted, and provide a better insight into variability of mass emissions during cyclic procedures than would be provided by continuous direct emission measurement. Other items continuously recorded were the vehicle speed, the oxygen level in the undiluted exhaust and the catalyst exit temperature. The instrumentation used for these continuously recorded data were as follows:

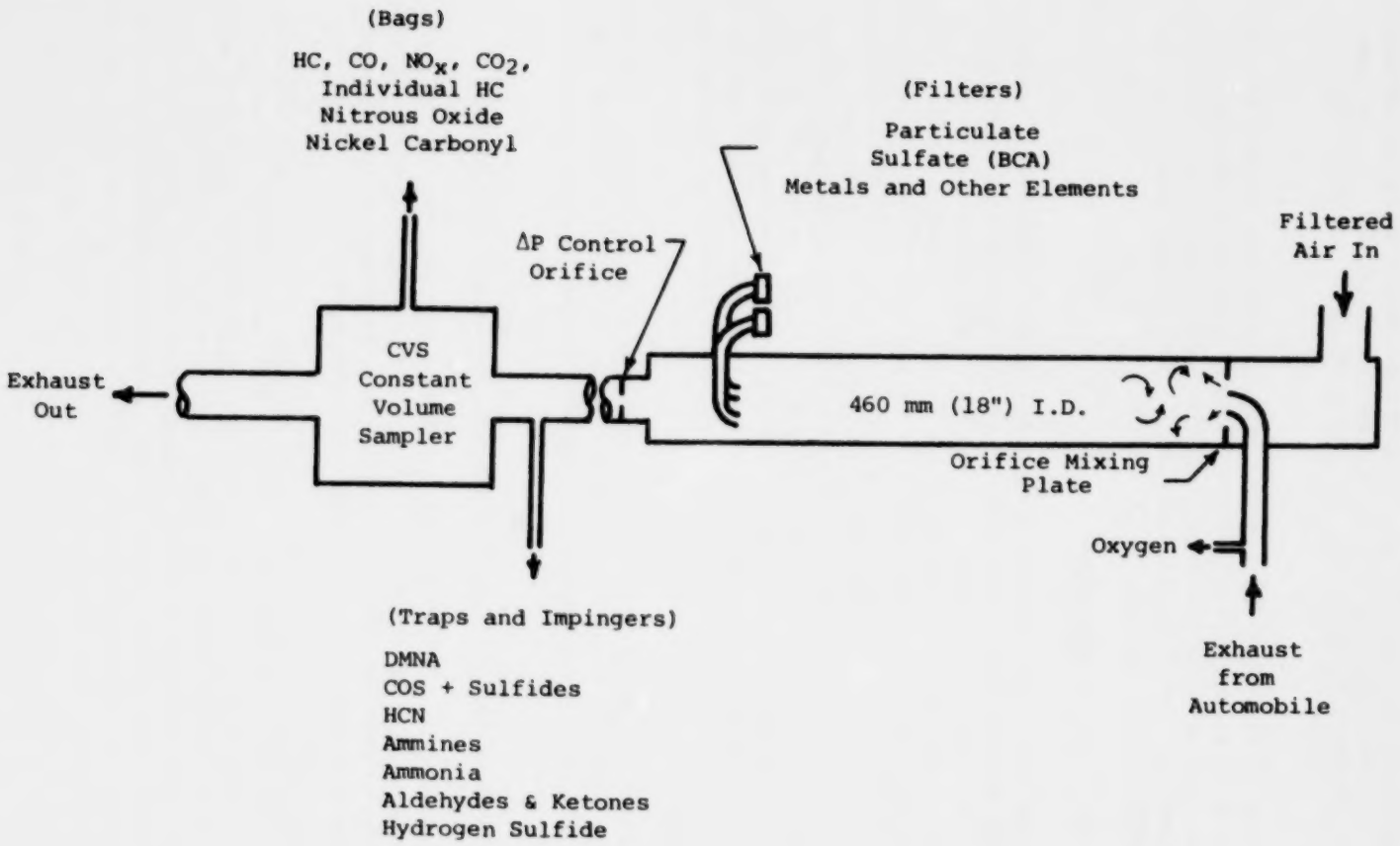
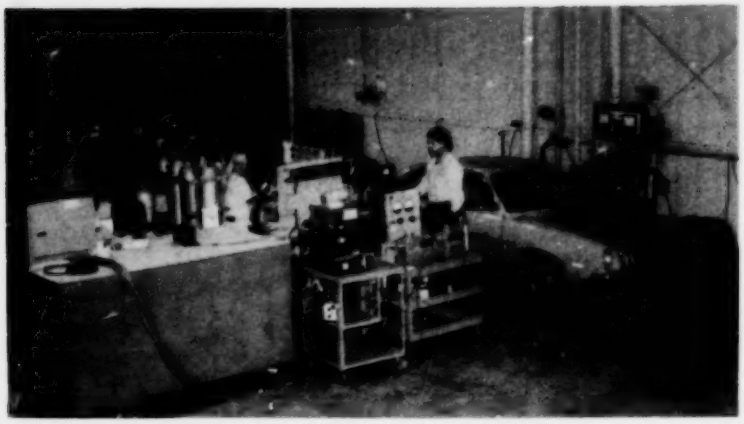
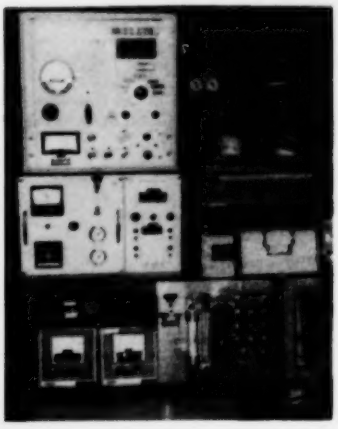


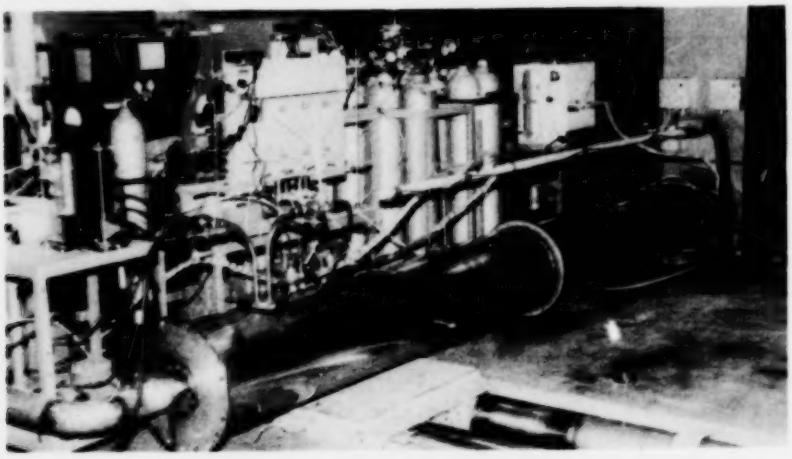
Figure 2. Gasoline engine emissions sampling system.



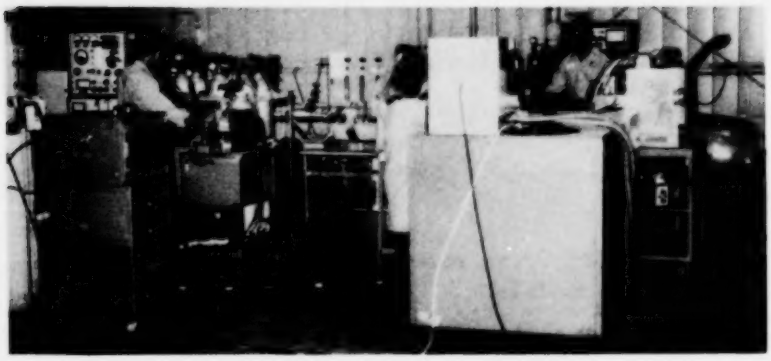
A. Entire Sampling System



B. Regulated Emissions



C. Dynamometer Side of System



D. CVS Side of System

Figure 3. Views of the emissions sampling system.

Parameter Measured	Instrument or Method		
	Type	Make & Model	Ranged Used
HC	FID	SwRI No. 007	100 through 3200 ppm
CO	NDIR	Beckman 315B	0.3, 0.6 & 1.5%
NO_x	CL	Thermo Electron 12A	100 & 1000 ppm
CO_2	NDIR	Beckman 315B	6%
O_2	Poloragraphic	Beckman 715	5 & 25%
Temp.	---------- Thermocouple ----------		
Speed	----- Parallel output from the Dynamometer Controls ---------		

These continuously recorded data were used for obtaining the catalyst maximum temperature and in helping to resolve any problems or questions occurring with the other test data. In addition, these data remain available in the event they may be useful in clarifying future findings.

The catalyst average temperature and the average oxygen level in the undiluted exhaust were obtained using Acromag 1324-LY-1 integrators. The average oxygen level was determined to have only a gross relative meaning for most of the these evaluations. Often times, the oxygen level was relatively high when the exhaust flow was low (e.g., idle and cut-throttle) and relatively low when the exhaust was relatively high (e.g., highway speed). The integration of the oxygen in the undiluted exhaust does not compensate for these changes in exhaust flow. It is possible to have a significant average oxygen level and yet be deficient in oxygen over some portions of the driving cycle. Therefore, the average oxygen level serves only a general indicator of the malfunction condition (e.g., average oxygen level decreases somewhat for rich operation). Catalyst temperatures were effected by the placement of the thermocouples and the cooling fans.

F. Emissions Test and Mileage Accumulation Procedures

The primary procedures and driving schedules utilized in this project, are defined as follows:

FTP - 1978 Federal Test Procedure[3] (uses the Urban Dynamometer Driving Schedule)

SET - Congested Freeway Driving Schedule[4]

HFET - Highway Fuel Economy Driving Schedule [5]

MDDS - Modified Durability Driving Schedule for mileage accumulation[6] (with all WOT Accelerations changed to normal Accelerations). This schedule is described in Appendix A-1.

Each of the three primary procedures and schedules, requiring emissions testing in this project (FTP, SET and HFET), utilized bagged samples for evaluation of regulated emissions and fuel consumption. In addition, evaluations of the regulated emissions were conducted using several short-cycle procedures. These short-cycle procedures are discussed in Section II, G.

The SET and the HFET are both hot-start, single-segment driving cycles. The FTP, however, involves cold-start, multi-cycle with multi-segment operation. In addition, in this project a four-bag FTP was utilized for most of the unregulated emissions; rather than the three-bag FTP specified in the Federal Test Procedure. Therefore, before proceeding, it is important to clarify the meaning of the FTP as used in this project:

FTP - The FTP used the Urban Dynamometer Driving Schedule (UDDS) which is 1371 seconds in duration. The UDDS, in turn, is divided into two segments; the first having 505 seconds and the second having 866 seconds. The Federal Test Procedure consists of a cold-start 505 and a stabilized 866 followed by a hot-start 505. In this project, the hot 505 was followed by another 866 segment. For the remainder of this discussion, and throughout this report, the four-cycle FTP will be identified as follows:

	Four-Cycle FTP			
	Cold UDDS		Hot UDDS	
Cycle	1	2	3	4
Duration, seconds	505	866	505	866
Regulated Emissions, 3-bag	X	X	X	
Regulated Emissions, 4-bag	X	X	X	X
Unregulated Emissions:				
Bag	X	X	X	X
Impinger	----X---		--- X ---	
Trap (Except DMNA)	----X---		--- X ---	
Trap DMNA	-------X---------			

NOTE: X designates a sample taken

A composite value in mass per distance for the three-cycle, three-sample FTP regulated emissions is calculated using the following forumla:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times (\text{MASS 1} + \text{MASS 2}) + 0.57 \times (\text{MASS 3} + \text{MASS 2})}{0.43 \times (\text{DIST. 1} + \text{DIST. 2}) + 0.57 \times (\text{DIST. 3} + \text{DIST. 2})}$$

Assuming Distance 3 is equal to Distance 1, this equation can be reduced to:

$$\text{3-FTP M/D} \cong \frac{0.43 \times (M1 + M2) + 0.57 \times (M3 + M4)}{D1 + D2}$$

For the four-cycle FTP, two sample, composite values determined in this project, the following formula was used:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times M(1 + 2) + 0.57 \times M(3 + 4)}{0.43 \times (D1 + D2) + 0.57 \times (D3 + D4)}$$

Assuming Distance 2 is equal to Distance 1 and Distance 4 is equal to Distance 2, then this equation can be reduced to:

$$\text{4-FTP M/D} \simeq \frac{0.43 \times M(1 + 2) + 0.57 \times M(3 + 4)}{D1 + D2}$$

Therefore, with the assumption that the changes in distance traveled are negligible, the composite results with the four-cycle FTP relative to results with the three-cycle FTP will differ only as the mass emissions emitted during Cycle 4 differ from that emitted during Cycle 2. An assumption made, that the overall effect of such differences were relatively minor, was validated in the Task 1 evaluations under EPA Contract 68-03-2499.

The test sequence followed for each automobile is given in Table 3. Sequences 1 through 7 were repeated for each of four malfunction conditions on each automobile. The sequence followed in the laboratory for running one set of emissions tests (FTP, SET and HFET) is given in Table 4.

The parameters of the three primary driving schedules, along with the two short-test driving cycles, are summarized in Table 5 and these schedules are illustrated in Figure 4. Other driving schedule designations frequently used are as follows:

Driving Schedule Designation Used	Other Common Designations
FTP	LA-4 and UDDS
SET	CFDS and SET-7
HFET	FET
NYCC	SET-8

G. Test Numbering System

The numbering system, established for the various related unregulated emissions projects being conducted at this laboratory, consists of six digits. One of the digits was not required for this project so a dash (-) was used in its place. The designation used for all vehicle testing, subsequent to the malfunction screening evaluation, was PVM-ST. The meaning of each letter or group of letters is described as follows:

TABLE 3. TEST SEQUENCE FOR EACH MALFUNCTION

Sequence	Operation Performed on Vehicle
upon receipt	Tune-up to manufacturer's specifications
1	Precondition for 1600 km (995 mi) using the MDDS
2	Run FTP, SET, HFET. Sample and analyze applicable Task 2 compounds
3	Precondition for 200 km (125 mi) using the MDDS
4	Modify to operate in a Task 1 malfunction condition.
5	Precondition for 100 km (62 mi) using the MDDS
6	Run FTP, SET, HFET; FTP, SET, HFET. Sample and analyze applicable Task 2 compounds
7	Run Short Cycle Procedures
8	Collect Pallflex filter sample over three FTP cycles (6 each UDDS)
9	Return to unmodified condition, replace the catalyst, and tune-up to manufacturer's specifications

FTP - Federal Test Procedure

SET - Congested Freeway Driving Schedule

HFET - Highway Fuel Economy Driving Schedule

MDDS - Modified Durability Driving Schedule

TABLE 4. LABORATORY TEST SEQUENCE

1. Precondition, UDDS

2. Soak 12 to 20 hours

3. FTP - 4 bags for gaseous emissions
   2 filter or impinger samples

4. Soak 20 minutes - Fan Off

5. Precondition first 505 seconds of UDDS

6. Idle 1 minute (± 15 seconds)

   (a) auto trans - drive
   (b) start additional cooling blowers
   (c) place filter holder in tunnel

7. SET - 1 bag sample
   1 filter or impinger sample

8. Engine Off - 10 minutes - Fan Off

9. HFET - 1 bag sample
   1 filter or impinger sample

Note: 5000 cfm fan on during all car operation. Additional tire and fuel tank cooling blowers on during all SET and HFET operation.

TABLE 5. SUMMARY OF DRIVING SCHEDULE PARAMETERS

	Duration, Seconds	Distance, Kilometers	Average Speed km/hr	Average Speed mph
FTP:				
505	505	5.8	--	--
866	866	6.2	--	--
UDDS	1371	12.0	31.4	19.5
SET	1398	21.7	56.0	34.8
HFET	765	16.5	77.6	48.2
Short-Cycle Procedures				
NYCC	599	1.91	11.5	7.1
FSC	125	1.21	34.9	21.7

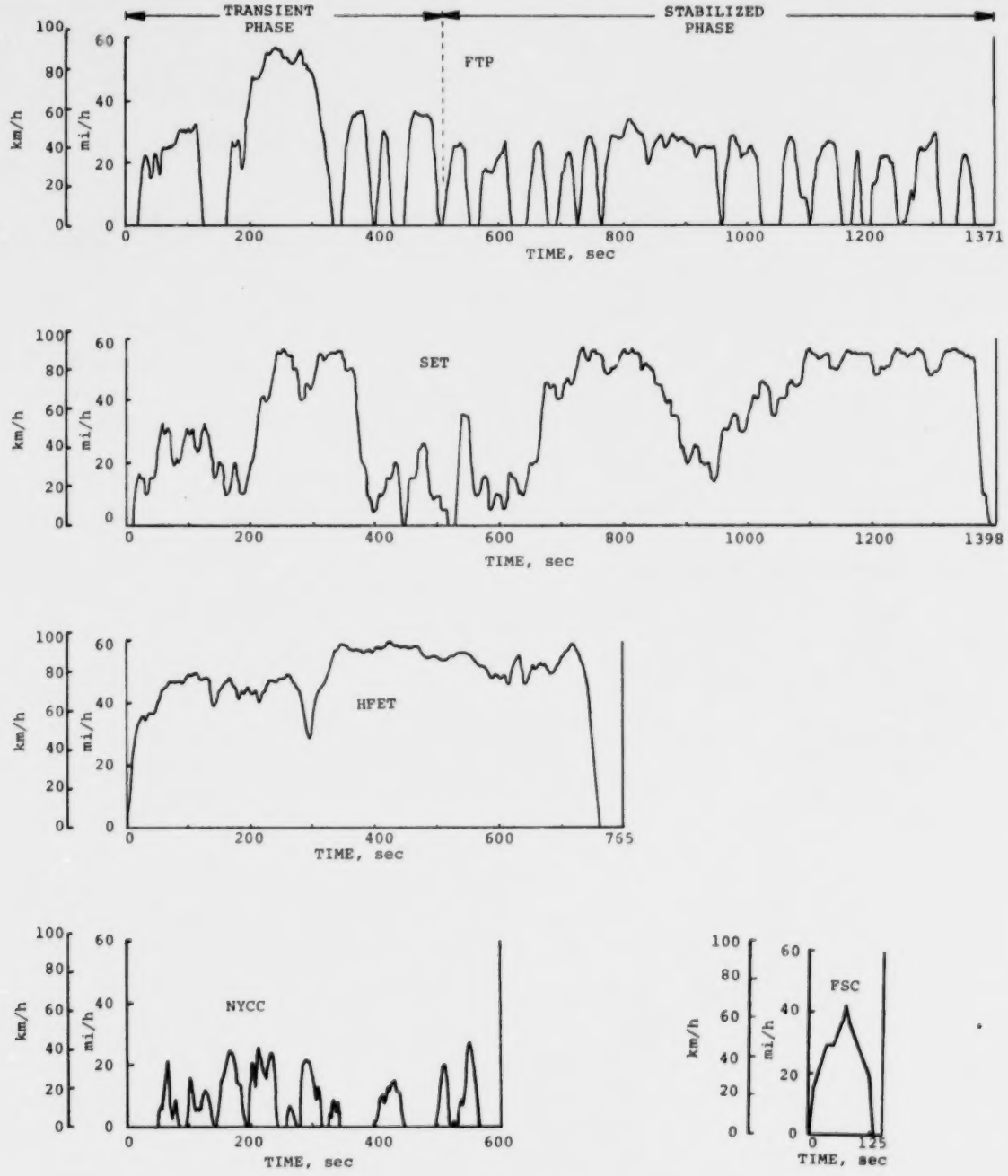


Figure 4. Driving cycle speed vs time traces.

	Description	As used for this project
PV	Vehicle Designation	
	P Project	4
	V Vehicle	1 through 3
M-	Condition Tested	
	M Malfunction	1 through 6
	- Space not used in this project	-
S	Test Series (Unmodified or Malfunction)	1 through 3
T	Individual Test (FTP, SET or HFET)	1 through 3
	(NYCC, FSC, TSIT or FTM)	4 through 7

The PV is used to identify the vehicle tested

In this project, the test condition is sufficiently identified by one digit so the M, followed by a dash (-), was used to identify the specific malfunction conditions.

The S designates the test series (FTP, SET, HFET) where:

1 = Unmodified vehicle
2 & 3 = Initial and repeat test in a malfunction configuration

The T designates the individual test conducted where:

1 = FTP
2 = SET
3 = HFET

H. Short-Test Procedures

Regulated emissions were also evaluated over four short-test procedures. These procedures described in Appendix A-2, are defined as follows:

NYCC - New York City Cycle

FSC - Federal Short Cycle

TSIT - Two Speed Idle Test

FTM - Federal Three Mode

The parameters for the NYCC and the FSC were given in previous Table 5 and the schedules were illustrated in Figure 4. All of these short-cycle procedures are conducted with the engine in a warmed-up operating condition. The NYCC involves a lot of idle and low-speed operation and has an average speed of only about one-third that of the FTP. The average speed of the FSC

is about equivalent to the that of the FTP. Emissions evaluations in these driving schedules involved bagged samples of CVS diluted exhaust.

The TSIT and FTM are steady-state procedures involving measurement of the concentrations of HC, CO and NO in the raw exhaust. HC was measured by non-dispersive infrared in units of ppm hexane. Nitric oxide was measured using a chemiluminescence analyzer; without the sample going through the converter. Measurement of NO rather than NO_x was specified. Also, with high concentrations of carbon monoxide and/or hydrocarbons in the exhaust, passage through the converter generally results in erroneous values for oxides of nitrogen. This factor has been well documented and reported in a number of previous projects.

The operating sequence followed for the short-cycle procedures is given in Table 6. Horsepower settings, used in this project for the FTM, were as follows:

Car No.	Description	NADA Weight + 181 kg (4000 lbs)	Dynamometer Setting, kW(hp) 40 km/h	84 km/h
41	Pinto	1250(2750)	4.5(6.0)	10.8(14.5)
42	Sunbird	1385(3050)	4.8(6.5)	10.1(13.5)
43	Saab 99	1315(2900)	4.8(6.5)	10.8(14.5)

Specified instrument ranges, for the undiluted emissions measured during steady-state evaluations were as follows:

HC 0-100 or 0-200 and 0-2000 ppm (Hexane)

CO 0-0.5% and 0-10%

NO 0-100, 0-1000, 0-2500 and 0-4000

Ranges as near as practical to these specified ranges were used.

I. Pallflex Filter Samples

Upon completion of each malfunction test series, a 20-cm by 25-cm (8" x 10") Type T60A20 Pallflex filter sample of diluted exhaust was taken for BaP and possible bioassay analyses at the EPA. The Pallflex filter samples were taken using a high-volume sampling system with a nominal sample flow rate of 0.85 standard m^3/min (30 scfm). The 8.9-cm (3.5-inch) inside diameter sampling probe required the use of an 18-inch diameter dilution tunnel. Available CVS flow rates for use in these evaluations were 9 and 14 standard m^3/min (300 and 500 scfm). A flow rate was selected which would keep the sample temperature at the Pallflex filter below 43°C (110°F).

The same filter was used throughout a 12-bag FTP (6 each UDDS). After weighing each filter, following sampling, the filters were sealed in a bag

TABLE 6. SEQUENCE FOR SHORT CYCLE PROCEDURES

DILUTE EMISSIONS TESTING - CVS

1. Check Inertia and Horsepower (Use same values as for FTP)

2. Run 505 Seconds of the FTP

3. Idle 6 minutes in Neutral with Fan On

4. RUN (NYCC) & COLLECT BAG

5. Idle 6 minutes in Neutral with Fan On

6. RUN (FSC) & COLLECT BAG - Use 1 CFM High Volume Sampler

RAW EMISSIONS TESTING - HC AND CO BY NDIR, NO OR NO_x BY CL

7. Idle 6 minutes in Neutral with Fan On
8. RUN TWO SPEED IDLE TEST (TSIT) - Three minutes per mode

   a. 2500 rpm in Neutral - measure during minutes 2 through 3
   b. Normal Idle in Neutral - measure during minutes 2 through 3

9. Continue Normal Idle for 6 minutes Total

10. Set Inertia at 1750 pounds (795 kg)

11. RUN FEDERAL THREE MODE (FTM)

    Minute 1 - Set _____* Horsepower at 52 mph (84 km/h)
           2 - Stabilize
           3 - Measure Emissions

    Minute 4 - Set _____* Horsepower at 25 mph (40 km/h)
           5 - Stabilize
           6 - Measure Emissions

    Minute 7 - Idle in Neutral
           8 - Stabilize
           9 - Measure Emissions

    * Dynamometer horsepower setting as determined from a special chart provided (Based on NADA weight + 181 kg (400 lbs.))

and stored in a freezer at minus 18 degrees centigrade (0°F). All processing on later samples was conducted under yellow light. The analyses of these filters were not included as a part of this project and are not discussed in this report.

J. Computational Methods

The methods used for calculating the unregulated emissions results are given in Appendix A-3. All regulated emissions were calculated using the methods prescribed in the Code of Federal Regulations of Light Duty Vehicles.[3] On the computer printouts for the regulated emissions, included in Appendices B and E, all items of potential interest are identified by descriptive headings. Items on the computer sheet identified only by abbreviated headings are used in calculating the unregulated emissions.

III. ANALYTICAL PROCEDURES FOR UNREGULATED EMISSIONS

The analytical procedures used to measure the unregulated emissions are summarized in this section. A detailed description of the procedures, along with a discussion of their development, validation, and qualification, is available in Interim Report II, "Analytical Procedures for Characterizing Unregulated Pollutant Emissions From Motor Vehicles," developed in a related EPA Project.[2]

A. Description of the Analytical Procedure

The unregulated emissions evaluated in this project, along with the methods for sampling and the procedures used in the analyses, are listed in Table 7. Organic amines, aldehydes and ketones, organic sulfides, individual hydrocarbons, and metals and other elements represent groups of compounds. The respective procedures separate and identify a number of individual compounds within each of these groups. The analytical procedures involved in this project are described briefly as follows:

Organic Amines - The collection of organic amines (monomethylamine, monoethylamine and dimethylamine, trimethylamine, diethylamine, and triethylamine) is accomplished by bubbling CVS diluted exhaust through glass impingers containing dilute sulfuric acid. The amines are complexed by the acid to form stable sulfate salts which remain in solution. A portion of this solution is then injected into a gas chromatograph equipped with an ascarite loaded pre-column and a nitrogen phosphorus detector (NPD). External amine standards in dilute sulfuric acid are used to quantify the results. Some analyses were also conducted using undiluted exhaust.

Ammonia - Ammonia in CVS diluted automotive exhaust is measured in the protonated form, NH_4^+, after collection in dilute H_2SO_4. The acidification is carried out in a glass impinger maintained at ice bath temperature. A sample from the impinger is then analyzed for ammonia in an Ion Chromatograph and the concentration in the exhaust is calculated by comparison to an ammonium sulfate standard solution.

Aldehydes and Ketones - The collection of aldehydes (formaldehyde, acetaldehyde, isobutyraldehyde and hexanaldehyde) and ketones (acetone and methylethylketone) is accomplished by bubbling CVS diluted exhaust through glass impingers containing 2,4-dinitrophenylhydrazine (DNPH) in dilute hydrochloric acid. The aldehydes and ketones (also known as carbonyl compounds) react with the DNPH to form their respective phenylhydrazone derivatives. These derivatives are insoluble or only slightly soluble in the DNPH-HCl solution and are removed by filtration followed by pentane extractions. The filtered precipitate and the pentane extracts are combined and

TABLE 7. SAMPLING AND ANALYSIS METHODOLOGY FOR UNREGULATED EMISSIONS

Compound	Sampling	Method of Analysis
Organic Amines	Impinger	Gas chromatograph with ascarite pre-column and nitrogen-phosphorus detector (GC-NPD).
Ammonia (NH_3)	Impinger	Ion chromatograph.
Aldehydes and Ketones	Impinger	Dinitrophenylhydrazone derivative. Gas chromatograph with flame ionization detector.
Hydrogen Sulfide (H_2S)	Impinger	Methylene blue derivative. Spectrophotometer.
Total Cyanide [Hudrogen Cyanide (HCN(and Cyanogen (C_2H_2)	Impinger	Cyanogen chloride derivative. Gas chromatograph with electron capture detector (GC-ECD).
Carbonyl Sulfide (COS) and Organic Sulfides	Trap	Gas chromatograph with flame photometric detector (GC-FPD).
Nitrous Oxide (N_2O)	Bag	Gas chromatograph with electron capture detector (GC-ECD).
Nickel Carbonyl ($Ni(CO)_4$)	Bag	Chemiluminescence (CL)
Individual Hydrocarbons	Bag	Gas chromatograph with flame ionization detector.
Metals and Other Elements	Filter	Weighed using microbalance. Spectral X-ray analysis at RTP.
Particulates	Filter	Weighed using microbalance.
Sulfate	Filter	Barium chloranilate derivative (BCA). Liquid chromatograph with ultraviolet detector.
DMNA	Trap	Gas chromatograph with mass spectrometer at RTI (GC-MS).

then the pentane is evaporated in a vacuum oven. The remaining dried extract contains the phenylhydrazone derivatives. The extract is dissolved in a quantitative volume of toluene containing a known amount of anthracene as an internal standard. A portion of this dissolved extract is injected into a gas chromatograph and analyzed using a flame ionization detector.

Hydrogen Sulfide - The collection of hydrogen sulfide is accomplished by bubbling CVS diluted exhaust through glass impingers containing a buffered zinc acetate solution which traps the sulfide ion as zinc sulfide. The absorbing solution is then treated with N,N-dimethyl-paraphenylene diamine sulfate and ferric ammonium sulfate. Cyclization occurs, forming the highly colored heterocyclic compound methylene blue (3,9-bisdimethylaminophenazothionium sulfate). The resulting solution is analyzed with a spectrophotometer at 667 mm in a 1-cm or 4-cm pathlength cell depending upon the concentration.

Total Cyanide (Hydrogen Cyanide plus Cyanogen) - The collection of total cyanide is accomplished by bubbling CVS diluted exhaust through glass impingers containing a 1.0 N potassium hydroxide absorbing solution. This solution is maintained at ice bath temperature. An aliquot of the absorbing reagent is then treated with KH_2PO_4 and Chloramine-T. A portion of the resulting cyanogen chloride is injected into a gas chromatograph equipped with an electron capture detector (ECD). External CN^- standards are used to quantify the results.

Carbonyl and Organic Sulfides - The collection of carbonyl sulfide (COS) and the organic sulfides, methyl sulfide (dimethylsulfide, $(CH_3)_2S$), ethyl sulfide (diethylsulfide, $(C_2H_5)_2S$) and methyl disulfide (dimethyl-disulfide, $(CH_3)_2S_2$), is accomplished by passing CVS diluted exhaust through Tenax GC traps at -76°C. At this temperature the traps remove the organic sulfides from the dilute exhaust. The organic sulfides are thermally desorbed from the traps into a gas chromatograph sampling system and injected into a gas chromatograph equipped with a flame photometric detector for analysis. External organic sulfide standards generated from permeation tubes are used to quantify the results.

Nitrous Oxide - For measurement of nitrous oxide, a sample of the CVS diluted exhaust is collected in a Tedlar bag. This bagged sample is then analyzed for nitrous oxide using a gas chormatograph equipped with an electron capture detector. Calibration blends are used to quantify the results. Gas chromatograph peak areas are obtained using a Hewlett-Packard 3354 computer system.

Nickel Carbonyl - Bagged samples of the CVS diluted exhaust are analyzed for nickel carbonyl ($Ni(CO)_4$) using a chemiluminescent NO_x analyzer modified with a No. 54 wratten filter. Bottled calibration blends are used to quantify the results. The instrument has linear response between 0.1 ppb and 0.1 ppm.

Individual Hydrocarbons - For measurement of selected individual hydrocarbons, methane (CH_4), ethane (C_2H_6), ethylene (C_2H_4), acetylene (C_2H_2), propane (C_3H_8), propylene (C_3H_6), benzene (C_6H_6), and toluene (C_7H_8), a sample

of CVS diluted exhaust is collected in a Tedlar bag. This bagged sample is then analyzed for individual hydrocarbons using a gas chromatograph system containing four separate columns and a flame ionization detector. The peak areas are compared to an external calibration blend and the individual concentrations are obtained using a Hewlett-Packard 3354 computer system.

Metals and Other Elements - The metals are collected as particulate on a 47-mm Fluoropore filter, which is then sent to Research Triangle Park (RTP) for analysis by X-ray spectroscopy. The diluted exhaust sample is taken isokinetically from within the dilution tunnel. Weight gain on the filter is determined by weighing the filter on a microbalance before and after sampling.

Particulate - The "particulate" is collected isokinetically on a 47-mm glass fiber filter. The amount of "particulate" collected is determined by weighing the filter on a microbalance before and after sampling.

Sulfate - Automotive exhaust is vented into a dilution tunnel where it is mixed with a flowing stream of filtered room air. In the tunnel, the SO_3 reacts rapidly with water in the exhaust to form sulfuric acid aerosols. The aerosols grow to a filterable size range within the tunnel and are collected isokinetically on a fluorocarbon membrane filter. Particulate sulfate salts are also collected on the filter.

Sulfuric acid collected on the filter is then converted to ammonium sulfate by exposure to ammonia vapor. The soluble sulfates are leached from the filter with a measured volume of an isopropyl alcohol - water solution (60% IPA). A fixed volume of the sample extract is injected into a high pressure liquid chromatograph (HPLC) and pumped through a column of strong cation exchange resin in Ag^+ form to scrub out the halides (Cl^-, Br^-) and then through a column of strong cation exchange resin in H^+ form to scrub out the cations and convert the sulfate to sulfuric acid. Passage through a reactor column of barium chloranilate crystals precipitates out barium sulfate and releases the highly UV absorbing chloranilate ions. The amount of chloranilate ions released is equivalent to the sulfate in the sample and is measured by a sensitive liquid chromatograph UV detector at 310-313 nanometers. All the reactions and measurment take place in a flowing stream of 60% IPA. The scrubber and reactor columns also function as efficient filter media for any solid reaction products formed during passage of the sample through the column system.

DMNA - The attempted measurement of N-nitrosodimethylamine was accomplished by collecting dilute exhaust (approximately 185:1 total dilution) in Tenax GC sampling cartridges and shipping the cartridges to Research Triangle Institute (RTI) for analysis by capillary gas-liquid chromatography/mass spectrometry. The single ion monitoring (m/e 74) procedure used is not specific to DMNA. Results using this procedure represent a total composite value for all materials having background ions of m/e 74 and the same retention time as DMNA. Since this procedure was not included in Interim Report II[2], a brief description of this procedure is included in Appendix A-2 of this report.

B. Validation and Qualification of the Analytical Procedures

The analytical procedures used in this project were subjected to a series of validation and qualification experiments. Validation experiments included checks for sample stability, sample collection efficiency, detector linearity, interferences, and analysis repeatability. The qualification experiments included the injection of the compound of interest into the tunnel with and without the presence of exhaust and the subsequent recovery of that compound at the procedure sampling point.

Sample stability checks were performed using repeated analyses of the same sample at intervals over a specified period of time and comparing the results to the initial analysis. Organic amines, aldehydes and ketones, ammonia, total cyanide, nitrous oxide and individual hydrocarbon samples were found to be stable for several days. Carbonyl and organic sulfides and the hydrogen sulfide samples were found to be stable for approximately one day. Nickel carbonyl is stable for only a few hours.

Sample collection efficiency experiments were performed by passing a known concentration of sample through a series of impingers or traps and analyzing each impinger or trap individually for the compound of interest. All procedures used in this project have a collection efficiency of 98% or better. Detector linearity experiments were performed by preparing several samples of various known concentrations and plotting the resulting peak areas versus the concentrations. All the procedures had linear response over the range of interest in this project.

To determine the interferences for each procedure, known exhaust components were introduced into the sample to determine their effect on the resultant measurements. To determine analysis repeatability, several samples of known concentrations were prepared and a number of complete analyses were performed at each concentration. The results of these tests were then compared to determine analyses repeatability.

The qualification experiments were performed to determine if the compounds of interest could travel the length of the dilution tunnel in the presence of dilute exhaust without significant loss by reaction with exhaust or the tunnel itself. The compounds were introduced at the same point at which the exhaust enters the tunnel and were sampled at the normal sampling point. Table 8 lists the procedures for which validation and qualification experiments were performed.

C. Accuracy of the Analytical Procedures

A difficult, but very important, endeavor was the determination of procedural accuracy for each analytical method. The primary difficulty involved those procedures in which the exhaust compounds are trapped or absorbed, an extraction or subsequent reaction is performed, and then a portion of the extraction is analyzed. After much consideration in the previous malfunction project, the decision was reached to initially define the accuracy in terms of a "mimimum detection value" (MDV). The MDV, as used in this report, is

TABLE 8. PROCEDURAL VALIDATION AND QUALIFICATION

Compound or Compound Group	Validation Conducted	Qualification Conducted
Organic Amines	Yes	Yes (significant tunnel losses)
Ammonia	Yes	Yes (signitifant tunnel losses)
Aldehydes and Ketones	Yes	Yes
Hydrogen Sulfide	Yes	Yes
Total Cyanide	Yes	Yes
Carbonyl Sulfide and Organic Sulfides	Yes	Yes (significant tunnel losses)
Nitrous Oxide	Yes	Yes
Nickel Carbonyl	Yes	No[a]
Individual Hydrocarbons	Yes	No[b]
Metals and Other Elements	No[b]	No[b]
Particulates	No[b]	No[b]
Sulfate	No[b]	No[b]
DMNA	No[c]	No[c]

[a] Compound considered too dangerous to perform qualification experiments.
[b] Established procedure.
[c] Performed at RTP and RTI.

defined as the value above which it can be said that the compound has been detected in the exhaust (i.e., the accuracy is equal to plus or minus the MDV at a measured value equal to the MDV). Determination of accuracy over the entire range of each procedure was beyond the scope of the project.

For compounds collected by bag samples, the MDV was determined from the instrument detection limits only and is independent of the sampling rate and duration. For compounds which are concentrated in impingers or traps, the MDV is dependent on the instrument detection limit, chemical workup, sampling rate and sampling duration. The MDV's listed in Table 9 were derived using the listed sampling rates and a 23-minute sampling period.

TABLE 9. EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

	Mol. Wt.	Sample Flow ℓ/min	µg/m³ per ppm	Procedural Minimum Detection Values[a] ppm	µg/m	MDV for FTP, mg/km[b]
Test Number, PVM-ST	--	--	--	--	--	--
Barometer, mm Hg	--	--	--	--	--	--
Humidity, g/kg	--	--	--	--	--	--
Temperature, °C	--	--	--	--	--	--
Total Fuel Sulfur, mg/km	--	--	--	--	--	--
Avg. Exh. Oxygen	32.00	--	--	--	--	--
Catalyst Avg. Temp., °C	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--
Carbon Dioxide, g/km	44.01	Bag	--	--	--	--
Fuel Cons., ℓ/100 km	--	--	--	--	--	--
Regulated Emissions						
Hydrocarbons (THC)	11.88	Bag	575	1.0[c]	575	10
Carbon Monoxide	28.01	Bag	1165	2.0[c]	2330	40
Oxides of Nitrogen	46.01	Bag	1915	0.5[c]	958	16
Particulates						
Total Particulates	--	14.0	--	--	<50	<1
Sulfate	96.01	14.0	4000	<0.01	6	0.1
Compound Group Totals						
Aldehydes & Ketones	--	4.0	--	--	--	≃0.5
Individual Hydrocarbons	--	Bag	--	--	--	≃0.5
Organic Sulfides	--	0.13	--	--	--	≃0.05
Organic Amines	--	4.0	--	--	--	≃0.1
Other Compounds						
Ammonia	17.03	4.0	710	0.01	7	0.1
Cyanide & Cyanogen	26.02	4.0	1080	0.01	11	0.2
DMNA	74.08	5.0	3080	--	--	--
Hydrogen Sulfide	34.08	4.0	1415	0.01	14	0.2
Nickel Carbonyl	107.75	Bag	7100	0.0001	0.7	0.01
Nitrous Oxide	44.02	Bag	1830	0.01	18	0.3

[a] Based on a 23-minute sampling period at the specified flow rate for all impinger, filter and trap collected samples.

[b] Based on µg/m³ in the diluted exhaust and typical UDDS (FTP 505 & 866) parameters (1371 seconds, 10 D.F., 206 m³ CVS flow, 12.0 km, 0.98 DSFC) mg/km for FTP ≃ µg/m³ × 206 ÷ 12.0 × 0.98 × 0.001 ≃ 0.0168 × µg/m³. For SET: mg/km ≃ 0.55 × mg/km for FTP. For HFET: mg/km ≃ 0.74 × mg/km for FTP.

[c] Based on the instrument ranges generally used in this project.

TABLE 9 (CONT'D). EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

	Mol. Wt.	CRC[d] Synonym	µg/m³ per ppm	Procedural Minimum Detection Values[a] ppm	µg/m³	MDV for FTP, mg/km[b]
Aldehydes and Ketones						
Formaldehyde	30.03	--	1250	0.01	15	0.2
Acetaldehyde	44.05	--	1830	0.01	20	0.3
Acetone[e]	58.08	2-Propanone	2415	0.01	25	0.4
Isobutyraldehyde		--	3000	0.01	30	0.5
Methyl Ethyl Ketone	72.12	2-Butanone	3000	0.01	30	0.5
Crotonaldehyde	70.09	2-Butenal	2915		--	--
Hexanaldehyde	100.16	Hexanal	4165	0.01	40	0.7
Benzaldehyde	106.13	--	4415	--	--	--
Individual Hydrocarbons						
Methane	16.04	--	665	0.05	30	0.5
Ethylene	28.05	Ethene	1165	0.03	30	0.5
Ethane	30.07	--	1250	0.03	30	0.5
Acetylene	26.04	Ethyne	1085	0.03	30	0.5
Propane	44.11	--	1835	0.02	30	0.5
Propylene	42.08	Propene	1750	0.02	30	0.5
Benzene	78.12	--	3245	0.02	30	0.5
Toluene	92.15	--	3830	0.02	30	0.5
Organic Sulfides						
Carbonyl Sulfide	60.08	--	2500	0.001	3	0.04
Methyl Sulfide	62.13	Dimethyl	2585	0.001	3	0.04
Ethyl Sulfide	90.19	Dimethyl	3750	0.001	4	0.06
Methyl Disulfide	94.20	Dimethyl	3915	0.001	4	0.06
Organic Amines						
Monomethylamine	31.06	Amino-Methane	1290	0.002	3	0.05
Monoethylamine[f]	45.09	Amino-Ethane	1875	0.002	4	0.05
Trimethylamine	59.11	--	2460	0.002	5	0.08
Diethylamine	73.14	--	3040	0.002	6	0.10
Triethylamine	101.19	--	4205	0.002	8	0.14

[a] & [b] See initial page of this table.

[d] Handbook of Chemistry and Physics, 54th Edition.

[e] Includes Acrolein - 56.07 and Propionaldehyde - 58.08 (CRC - Propenal and Propanal respectively).

[f] Includes Dimethylamine - 45.09.

IV. MALFUNCTION SELECTION AND SCREENING EVALUATIONS

Prior to starting the vehicle testing phase on the three cars acquired for this project, a short series of tests were conducted using the 1978 Pontiac Sunbird. The purpose of these tests was to provide data toward selection of the four malfunction conditions and to verify the applicability of the analytical methods developed for the evaluation of the unregulated emissions. This section discusses the initial selection of malfunction conditions along with the results of the actual laboratory screening evaluations.

A. Selection of Malfunction Conditions

Malfunction conditions were discussed with the three manufacturers who provided cars for this project. The findings are briefly summarized as follows:

There were essentially no data available on these cars to establish which specific malfunctions are most likely to occur in actual in-service operation.

The representatives from the manufacturers all indicated that most lean mixture failures result in unacceptable driveability; especially during cold-start.

There was general concensus that a disrupted oxygen signal (due to either an open electrical circuit or sensor failure) should be among the more likely failure modes.

The idle-mixture adjusting screw is generally very difficult to get at. Therefore, a determined effort is generally required to adjust the idle-mixture setting.

A relatively large number of possible malfunction configurations were identified. These possible malfunctions, however, could be reduced to only a few separate categories. The primary categories are listed on the following page.

For the malfunction screening evaluations, it was decided to utilize the 1978 Pontiac Sunbird with each of the preceding malfunction conditions except high oil consumption and leaded fuel.

	Application		
	Ford Pinto	Pontiac Sunbird	Saab 99
Disabled Oxygen Sensor	X	X	X
Other Rich Operation	X	X	X
Lean Operation	X[a]	X[a]	X[a]
Disabled EGR	X	X	NA
Ignition Misfire	X	X	X
High Oil Consumption	X	X	X
Leaded Fuel[b]	X	X	X

[a] Lean operation predicted to produce poor driveability.
[b] Leaded fuel was subsequently deleted from consideration due to unavailability of procedures for measuring halogen compounds.

B. Description of Malfunction Conditions

Each of the primary malfunction categories are briefly described as follows:

Disabled Oxygen Sensor - The most straight-forward method is to disconnect electrical lead to the sensor. With the oxygen sensor disconnected, the fuel control system generally goes into a preset fuel-rich mode of operation.

Other Rich Operation - A number of other methods were found to obtain fuel-rich operation. Based on the results obtained in related malfunction projects, however, the specific method of attaining fuel-rich operation does not appear to be a very important factor relative to the emissions produced.(1)

Lean Operation - Lean operation was generally found to result in poor to unacceptable driveability; primarily under cold-start operating conditions.

Disabled EGR - In addition to the three-way catalytic converter, the Ford Pinto and the Pontiac Sunbird also had EGR. The most straight-forward method for disabling the EGR system was to remove and plug the vacuum actuation hose to the EGR valve. Since these cars utilized only a relatively small amount of EGR, disabling the EGR system had essentially no noticeable effect on driveability.

Engine Misfire - An Electronic Ignition Misfire unit was assembled in accordance with schematics obtained from the EPA Project Officer. The system

was designed and used by Exxon Research and Engineering Company in a previous EPA contract. With only a few difficulties, the initial unit assembled by SwRI functioned well; reflecting good circuit design by Exxon.

Using a standard oscilloscope and the scope of a Sun 1120 Electronic Ignition Tester, it was determined that this unit functions as follows:

Misfire Setting, Percent	Misfire Unit Operation
00.00 to 10.00	Misfires the tenth ignition signals to the extent necessary
10.00	Misfires every tenth ignition signal
10.01 to 19.99	Misfires every tenth ignition signal plus fifth ignition signals to the extent necessary
19.99	Misfires every tenth and essentially every fifth ignition signals (19.99 is the maximum setting)

Accuracy of this unit was determined by actual counts in slow-speed operation on a bench set-up and in higher speed operation on a vehicle using sequence comparison. The system was determined to be accurate to better than two decimal places (e.g., a setting of 10.01 percent produced 10.01 percent misfire). A second unit was loaned to another organization through the EPA. That organization, using a high-speed oscillograph, also reported that this misfire system was inherently accurate.

In the related malfunction project, a misfire setting of twelve percent was used.(1) This amount of misfire was determined to be the limit at which driveability remained reasonably acceptable to some people. It was decided to also use a twelve percent ignition misfire setting in this project. This setting is considered to be representative of the extreme, rather than the most frequent misfire malfunction that might be encountered among the automobile population.

High Oil Consumption - In the related malfunction project, it was determined that adding a litre (or quart) of oil at every gasoline fill-up would probably be the very limit of tolerance.(1) An oil consumption rate of one litre per 500 kilometer (one quart per 300 miles) was selected for use in that project. The same rate of consumption was used in this project.

An oil consumption system, developed in the related malfunction project, achieved the simulation of oil consumption through the intake valve guides. This system consisted of a multi-channel, low flow-rate peristaltic pump with separate lines to each engine cylinder utilized. The lubricating oil exits onto the intake valve stem at a constant flow rate (except for minor short-term flow changes that occur following a rapid change in engine manifold pressure). The flow rate was individually set for each test cycle to obtain an average oil consumption rate of 2.0 ± 0.2 millilitre per kilometer

(300 ± 30 miles per quart).

System installation required a 1/2-NPT (13 mm threaded) port into the intake manifold for each engine cylinder to be utilized. This generally required removing the intake manifold from the engine. With the intake manifold replaced on the engine, 1/8 inch (3.2 mm) outside diameter stainless steel tubing assemblies with compression fittings, were fitted and installed into each threaded port. A U-shaped guide welded onto the end of each tube assured proper horizontal alignment with the intake valve stems. After assuring proper location and contact between the ends of the tubes and the intake valve stems, the tubes were locked into position by tightening the compression fittings.

Once installed, the system could provide a wide range of oil consumption flow rates to the engine. Other than the fact that the installation of this system was rather tedious, no significant difficulties were experienced with this system on any of the cars tested.

C. Malfunction Screening Evaluations

A series of emissions evaluations were conducted using the 1978 Pontiac Sunbird. The purpose of these evaluations was to verify the applicability of the analytical procedures and to assist in the final selection of malfunction configurations for use in the Vehicle Testing phase of this project. The test plan for these malfunction screening evaluations is given in Table 10.

The results of these screening evaluations are summarized in Table 11. A repeat of this summary, the repeat test data, the computer printouts for regulated emissions and the individual sample FTP results are given in Appendix B. The individual 4-bag individual sample results in Appendix B are an approximation of the net emissions (exhaust minus background emissions).

The definitions for the engine configuration, as used in these malfunction screening evaluations, are as follows:

Unmodified - Car as received with the engine tuned-up to manufacturer's specifications.

Disabled O_2 Sensor - Disconnected electrical connection to the oxygen sensor.

Disabled EGR - Vacuum line to EGR was disconnected and plugged.

12% Misfire - Ignition misfiring at 12 percent.

Full Lean - Manifold vacuum from accumulator applied to the feedback-controlled diaphragm.

Max. Rich Idle - Richest mixture producing reasonably acceptable idle (i.e., slight lope).

TABLE 10. TEST PLAN FOR MALFUNCTION SCREENING EVAULATIONS

A. Use 1978 Pontiac Sunbird with 151-4 engine and 3-way catalyst
B. Tune-up to manufacturer's specifications
C. Run 4-bag FTP and sample regulated and unregulated emissions for the following configurations

Test No.	Engine Condiguration	Obtained By
42A1-1	Unmodified	----------
42A1-2	Unmodified	----------
42B2-1	Disabled O_2 Sensor	Disconnection of Electrical Plug
42C1-1	Disabled EGR	Remove and Plug Vacuum Line
42C2-1	Disabled EGR w/o O_2	Configuration B2 plus C1
42D1-1	12% Misfire[a]	Misfire Generator
42D2-1	12% Misfire w/o O_2[a]	Configuration B2 plus D1
42D2-2	12% Misfire w/o O_2[a]	Configuration B2 plus D1
42A1-3(1)	Unmodified	----------
42A1-3(2)	Unmodified	----------
42E1-1	Full Lean[b]	Simulation of Vacuum Modulator Stuck Open
42F2-1	Max. Rich Idle w/o O_2	Slight lope at idle plus B2
42G2-1	Maximum Rich	Simulation of Vacuum Modulator Stuck Closed
42A1-4	Unmodified (Reg. Emis. Only)	----------

[a] Marginally acceptable driveability
[b] Cold-start driveability unacceptable, driveability after warm-up was marginally acceptable

TABLE 11. SUMMARY OF THE MALFUNCTION SCREENING FTP RESULTS
In mg/km (Except as Noted)

		Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number,	PVMT-R	Low	High	Avg.	42B?	42C1	42C2	42D1	42D2	42E1	42F2	42G2
Barometer,	mm, Hg	738.9	741.7	740.5	743.5	743.2	742.2	743.7	739.4	742.7	742.7	738.6
Humidity,	g/kg	8.9	10.5	9.9	8.2	11.6	8.3	8.5	9.8	9.7	11.8	9.4
Temperature,	°C	21.1	22.8	22.1	22.8	22.8	21.1	20.6	22.2	22.2	22.2	21.7
Total Fuel Sulfur,	mg/km	23.02	24.97	24.15	26.64	23.74	26.40	25.14	30.06	23.78	28.86	29.36
Avg. Exh. Oxygen,	%	--	--	--	--	--	--	--	--	--	--	--
Catalyst Avg. Temp.,	°C	400.	416.	408.	338.	402.	329.	525.	495.	435.	329.	342.
Catalyst Max. Temp.,	°C	508.	525.	518.	431.	504.	423.	661.	637.	513.	397.	414.
Carbon Dioxide,	g/km	246.6	267.3	258.5	214.0	255.5	194.9	256.5	224.9	258.2	207.0	216.0
Fuel Cons.,	ℓ/100 km	10.74	11.65	11.26	12.43	11.08	12.32	11.73	14.02	11.09	13.47	13.70
Regulated Emissions												
Hydrocarbons	g/km	0.23	0.25	0.24	1.40	0.17	1.60	1.76	8.00	0.17	2.02	1.54
Carbon Monoxide	g/km	2.76	3.37	3.01	46.35	2.19	56.46	8.10	49.82	0.72	64.95	63.65
Oxides of Nitrogen	g/km	0.37	0.43	0.40	0.15	0.77	0.16	0.24	0.11	0.75	0.29	0.25
Particulates												
Total Particulates		3.32	8.76	5.53	23.77	6.71	17.91	12.57	16.67	5.42	24.95	6.74
Sulfate		0.33	1.07	0.69	0.21	0.52	0.42	0.22	1.97	0.63	0.69	0.17
Sulfate as % of TFS,	%	0.44	1.51	0.97	0.26	0.73	0.53	0.29	2.16	0.88	0.80	0.19
Compound Group Totals												
Aldehydes and Ketones		1.8	3.9	3.2	4.3	7.3	8.9	6.7	5.9	4.2	0.7	3.2
Individual Hydrocarbons		--	--	--	--	--	--	--	--	--	--	--
Organic Sulfides		0.06	0.18	0.10	0.70	0.14	1.48	1.38	2.37	0.07	0.36	0.23
Organic Amines		0.00	0.13	0.03	--	0.08	0.13	0.07	0.02	0.03	0.00	0.02
Other Compounds												
Ammonia		3.53	3.64	3.59	--	18.18	139.96	27.36	--	--	--	--
Cyanide and Cyanogen		1.83	1.97	1.90	10.15	1.79	17.82	10.07	--	--	--	--
DMNA		--	--	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide		0.02	0.72	0.25	0.62	0.00	0.46	1.18	7.73	--	0.49	0.47
Nickel Carbonyl		0.00	0.00	0.00	--	--	--	--	--	0.00	0.00	0.00
Nitrous Oxide		--	--	--	--	--	--	--	--	--	--	--

* Results for the individual runs are given in Appendix B

TABLE 11 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING FTP RESULTS
In mg/km (Except as Noted)

		Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number, PVM-ST		Low	High	Avg.	42B2	42C1	42C2	42D1	42D2	42E1	42F2	42G2
Trace Elements[a]												
Chromium	Cr											
Lead	Pb		0.11	0.05	0.09		0.13		0.05	0.09		
Manganese	Mn	0.02	0.05	0.07	0.06	0.06	0.05	0.06	0.06	0.08	0.01	0.04
Arsenic	As											
Mercury	Hg											
Bromine	Br		0.04	0.02	0.05			0.03	0.04		0.03	
Phosphorus	P	0.01	0.02	0.01	0.01		0.01	0.02	0.02	0.03	0.02	0.01
Silicon	Si								0.01			
Cadmium	Cd		0.01	0.01								
Aluminum	Al		0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01
Sulfur	S	0.02	0.04	0.03	0.02	0.02	0.03	0.04	0.08	0.03	0.04	0.02
Sodium	Na											
Fluorine	F									0.01		
Magnesium	Mg											
Potassium	K											
Chlorine	Cl	0.01	0.03	0.02	0.01	0.02	0.01	0.06	0.05	0.02	0.02	0.02
Platinum	Pt											
Zinc	Zn	0.01	0.07	0.03	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.01
Copper	Cu	0.02	0.04	0.03			0.03		0.03	0.03		
Nickel	Ni											
Iron	Fe	0.06	0.15	0.09	0.10	0.10	0.18	0.21	0.24	0.11	0.03	0.07
Vanadium	V											
Titanium	Ti											
Barium	Ba											
Calcium	Ca	0.03	0.05	0.04	0.04	0.03	0.03	0.04	0.05	0.06	0.03	0.04

[a]All blank spaces for other elements represent a value of 0.00

TABLE 11 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING FTP RESULTS
In mg/km (Except as Noted)

	Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number, PVM-ST	Low	High	Avg.*	42B2	42C1	42C2	42D1	42D2*	42E1	42F2	42G2
Aldehydes and Ketones											
Formaldehyde	0.79	1.42	1.10	1.05	1.59	1.42	1.47	1.01	2.35	0.12	1.09
Acetaldehyde	0.17	1.48	0.91	2.90	2.41	4.33	2.47	3.25	1.00	0.00	1.36
Acetone	0.00	0.44	0.26	0.37	0.62	1.14	0.17	0.45	0.26	0.00	0.37
Isobutyraldehyde	0.00	0.09	0.02	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00
Methyl Ethyl Ketone	0.15	1.50	0.77	0.00	2.59	1.44	2.55	0.84	0.23	0.06	0.16
Crotonaldehyde	--	--	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.11	0.23	0.17	0.00	0.09	0.61	0.00	0.07	0.32	0.48	0.18
Benzaldehyde	--	--	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	1.8	3.9	3.2	4.3	7.3	8.9	6.7	5.9	4.2	0.7	3.2
Total as % of THC, %	0.8	1.7	1.4	0.3	4.3	0.6	0.4	0.1	2.5	0.0	0.2
Individual Hydrocarbons											
Methane	--	--	--	--	--	--	--	--	--	--	--
Ethylene	--	--	--	--	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--	--	--	--	--
Acetylene	--	--	--	--	--	--	--	--	--	--	--
Propane	--	--	--	--	--	--	--	--	--	--	--
Propylene	--	--	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--	--	--	--	--
Total Individual HC	--	--	--	--	--	--	--	--	--	--	--
Total as % of THC, %	--	--	--	--	--	--	--	--	--	--	--
Organic Sulfides											
Carbonyl Sulfide	0.03	0.18	0.08	0.70	0.11	0.48	1.36	2.37	<0.01	0.33	0.19
Methyl Sulfide	<0.01	0.06	0.02	0.00	0.03	0.00	0.02	0.00	0.07	0.03	0.04
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00
Organic Amines											
Monomethylamine	0.00	0.05	0.01	--	0.06	0.07	0.05	0.00	0.02	0.00	0.00
Monoethylamine	0.00	0.08	0.02	--	0.02	0.06	0.02	0.00	0.01	0.00	0.02
Trimethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Maximum Rich - Vacuum line to the feedback-controlled diaphragm was disconnected and plugged.

Referring to the data in Table 11, the 12 percent misfire with the oxygen sensor disconnected produced the highest values for hydrocarbons, sulfate, organic sulfides and hydrogen sulfide. The values for CO and total particulates, under this malfunction, approached the highest values measured. The highest value for NO_x occurred with disabled EGR and with the full-lean condition. Fuel consumption under malfunction, relative to unmodified, increases by 20 percent or more with 12% misfire plus disabled oxygen sensor, rich idle plus disabled oxygen sensor, and the maximum rich condition. A 20 percent increase in fuel consumption was considered to be unacceptable. Cold-start driveability was unacceptable under the full-lean malfunction condition. The highest emissions values measured, for the unmodified configuration and for those malfunctions producing acceptable driveability and fuel consumption, are summarized as follows:

	Unmod.,	Malfunction		
	mg/km	mg/km	Mal/Unmod	Description
Hydrocarbons	250	1760	7	12% Misfire
Carbon Monoxide	3000	56500	19	Disabled EGR & O_2
Oxides of Nitrogen	4000	770	2	Disabled EGR
Total Particulates	9	24	3	Disconnected O_2 Sensor
Sulfate	1	1	<1	Disabled EGR
Aldehydes and Ketones	4	9	2	Disabled EGR & O_2
Organic Sulfides	<1	>1	>1	Disabled EGR & O_2
Cyanides and Cyanogen	2	18	9	Disabled EGR & O_2
Hydrogen Sulfide	<1	>1	>1	12% Misfure

As shown, the highest emission rates occurred more frequently with 12% misfire, disabled EGR, disconnected oxygen sensor, and with both the EGR and the oxygen sensor disabled.

V. VEHICLE TESTING

Regulated and unregulated emissions from three 1978 model cars were measured with the cars operating under selected malfunction conditions. All three cars utilized a three-way catalytic converter for controlling HC, CO and NO_x emissions. This section presents the results of those evaluations.

A. Test Matrix

The cars, malfunction conditions and procedures are described in previous Section II through IV. The test matrix for the cars and malfunctions is given in Table 12. All three cars were tested with the oxygen sensor disabled and with 12 percent ignition misfire. Two of the cars were tested with disabled EGR and oxygen sensor and with high oil consumption. Disabled oxygen sensor plus disabled air injection system and disabled oxygen sensor plus rich best idle malfunction configurations were each evaluated in one car.

Due to the configuration of the intake manifold and underhood component interferences on the Pontiac Sunbird, Car Test 424, the additional oil could only be supplied to two of the four intake valve stems. This resulted in a relatively high flow rate of motor oil into these two cylinders.

B. Unregulated Emissions Test Results

Summaries of the test results are included in Appendix C. Individual sample data for the FTP evaluations are included in Appendix D and the computer printouts for the regulated emissions are included in Appendix E.

In all data tables, a double dash (--) has been used when no test data were available. This occurs for those unregulated emissions which were only tested on a spot-check basis and when valid test data could not be obtained due to instrument malfunction or loss of the sample. With the large number of samples, analyses and personnel required for conducting these evaluations, it was not possible to consistently obtain a 100 percent complete set of data. In a few cases the difficulty encountered with an unregulated emission data point could be satisfactorily corrected. For those data in which the correction involved more than simple multiplication by an appropriate factor, the data are reported to a lessor number of decimal points.

All FTP unregulated emissions data, with the exception of DMNA[a], are based on appropriately weighted four-cycle FTP results. The DMNA evalua-

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[a] In this report, the term DMNA represents the total concentration of all materials measured from a mass spectrometric signal at m/e 74.

TABLE 12. SUMMARY OF MALFUNCTION CONDITIONS TESTED

Car	Description	Malfunction Configuration[a]					
		Dis. O_2 Sensor	12 % Ign. Misc.	Dis. O_2 & EGR	High Oil Cons.	Dis. O_2 & Air	R.B.I. & Dis. O_2
41	Ford Pinto	411	412	413	--	415	--
42	Pontiac Sunbird	421	422	423	424	--	--
43	Saab 99	431	423	--	434	--	436

[a]Disabled oxygen sensor
12 percent ignition misfire
Disabled oxygen sensor and EGR
High oil consumption (2 ml/km - 300 miles/qt.)
Disabled oxygen sensor and air to dump
Rich best idle and disabled oxygen sensor

tions consisted of a single trap taken continuously over the first three cycles of the four-cycle FTP. If most of the DMNA were formed during the cold-start 505, then the reported DMNA data would be on the high side (up to a maximum of about 1.5 times the value that would be obtained in a standard weighted three-sample FTP). If the the DMNA were produced at a constant rate in all three cycles, then such weighted composite results would be essentially identical to these continuous sample three-cycle results.

C. Short-Test Procedure Results

The regulated emissions were measured over two short driving cycles and two steady-state test procedures. Initially, a Barnes "garage type" NDIR analyzer, obtained on loan from the EPA, was used to measure HC and CO in the undiluted exhaust. This analyzer developed serious operational difficulties and was subsequently replaced with laboratory grade NDIR instruments. The analyzers used are in a Beckman cart which was initially designed for and used in nine-mode heavy-duty engine evaluations.

Initially, the oxides of nitrogen were determined with the chemiluminescence instrument in the NO_x mode. In reviewing the initial short-test results, these oxides of nitrogen results were found to be questionable. Upon further checking, it was determined that the chemiluminescence instrument did not read correctly for many of these evaluations of the undiluted exhaust when high amounts of HC and/or CO were present. Similar difficulties, involved in measuring oxides of nitrogen in undiluted exhaust using a chemiluminescence analyzer, have been observed a number of times in previous projects. Three of these observations were reported in the following final reports:

- C. M. Urban and K. J. Springer, "13-Mode Diesel Emissions Test Results on 12 Trucks." Report for Engine Manufacturers Association, February 20, 1976.

- K. J. Springer, "Exhaust Emissions from Rebuilt Heavy Duty Truck Engines." Final Report of Task No. 3 to the U.S. Environmental Protection Agency under Contract No. 68-03-2196, July 1976.

- C. M. Urban and K. J. Springer, "Heavy Duty Fuel Economy Program Phase II - Evaluations of Emission Control Technology Approaches." Report EPA-460/3-77-010 to the U.S. Environmental Protection Agency under Contract No. 68-03-2220, July 1977.

The difficulties encountered were resolved by assuring that all subsequent undiluted exhaust evaluations were conducted with the instrument in the NO mode (i.e., bypassing the converter). Engine configurations missed during the period of difficulty with the Barnes and/or chemiluminescence analyzers were reevaluated.

Several repeat runs were conducted for a couple of the configurations. Comparative data obtained with the Barnes analyzer, when it was operable, and the Beckman analyzers are reported as follows:

	TSIT 421-26[a]					
	2500 RPM			IDLE		
	Run 1[a]	Run 2[b]	Avg.	Run 1[a]	Run 2[b]	Avg.
HC, ppm H	108	132	120	220	175	198
CO, %	2.15	2.42	2.29	4.65	4.37	4.51

	FTM 421-27[a]								
	52 MPH			25 MPH			IDLE		
	Run 1[a]	Run 2[b]	Avg.	Run 1[a]	Run 2[b]	Avg.	Run 1[a]	Run 2[b]	Avg.
HC, ppm H	168	163	166	182	171	177	210	163	187
CO, %	4.50	4.76	4.63	2.85	2.93	2.89	4.65	4.58	4.62

[a] Run 1 was with the Barnes Infrared Emissions Analyzer for HC and CO
[b] Run 2 was several weeks later using Beckman NDIR analyzers for HC and CO

These data illustrate that the "garage type" emissions analyzer, when operable, produced results that agreed reasonably well with values obtained using laboratory grade instruments.

The short test results are reported in Appendix F. Each of the three emissions measured are discussed separately as follows:

Hydrocarbons - The HC results are summarized as follows:

Test No.	Description	Transient Cycle, g/km			Steady State modes,[a] ppmH		
		FTP	NYCC	FSC	Idle	2500	Power
41	Unmod.	0.1	<0.1	<0.1	45	45	45
411	Dis. O_2	0.1	0.1	0.1	45	55	55
412	12% Miss	0.1	<0.1	0.1	40	40	40
413	Dis. EGR & O_2	0.4	0.4	0.3	45	45	45
415	Dis. Air & O_2	0.9	0.9	0.7	50	150	190-220
42	Unmod.	0.2	<0.1	<0.1	40	45	40
421	Dis. O_2	1.5	2.4	1.1	170	130	160-170
422	12% Miss	1.1	0.3	0.1	60	150	130-220
423	Dis. EGR & O_2	1.4	2.2	1.1	210	150	170-180
424	Oil Cons.	0.2	0.2	0.1	50	60	50
43	Unmod.	0.1	<0.1	<0.1	50	50	50
431	Dis. O_2	0.7	0.9	0.5	90	80	125
432	12% Miss	2.2	3.3	1.9	460	500	390-480
436	Dis. O_2 & RBI	0.8	1.6	0.7	140	110	140-180
434	Oil Cons.	0.1	0.1	0.1	50	50	60

[a] Idle, 2500 rpm, 52 MPH (84 km/hr) and 25 MPH (40 km/hr)

With five exceptions (Tests 41, 412, 42, 422 and 43), the HC emissions in the NYCC were about equal to or up to two times as high as the values for the FTP. For four out of these five exceptions, the FTP values were 0.2 g/km or less. The FSC results were generally equal to or slightly lower than the FTP values.

The two primary exceptions to a general relationship occurred with the 12 percent misfire malfunction condition; where the FTP results were considerably higher than the NYCC and the FSC results. This was apparently due to raw fuel that was able to pass through the catalytic converter during the cold-start portion of the FTP.

The relationship between the HC in the undiluted exhaust during idle and in FTP composite results was somewhat car dependent. These results are resummarized as follows:

Car	HC Emissions	
	FTP, g/km	Idle, ppmH
41	0.1-1.0	40-50
42	0.2-1.1	40-60
	1.4-1.5	170-210
43	0.1	50
	0.7-0.8	90-140
	2.2	460

The relationship between the HC for the FTP and the other steady-state operating conditions was considerably better. These results are resummarized as follows:

Car	FTP	2500	Power Modes
41	0.1-0.4	40-55	40-55
	1.0	150	190-220
42	0.2	45-60	40-50
	1.1-1.5	130-150	130-220
43	0.1	50	50-60
	0.7-0.8	90-140	125-180
	2.2	460	390-480

Carbon Monoxide - The CO results are:

Test No.	Description	Transient Cycle, g/km FTP	NYCC	FSC	Steady State modes, % Idle	2500	Power
41	Unmod.	1.4	0.1	<0.1	0.0	0.0	0.0
411	Dis. O_2	2.3	2.0	1.1	0.0	0.0	0.1-0.2
412	12% Miss	2.6	0.9	0.5	0.0	0.0	0.0
413	Dis. EGR & O_2	2.0	6.9	5.7	0.0	0.0	0.1-0.4
415	Dis. Air & O_2	33.2	26.2	20.1	0.0	1.8	2.8-4.0
42	Unmod.	2.8	1.4	0.2	0.0	0.0	0.0
421	Dis. O_2	55.6	82.0	33.5	4.5	2.4	2.9-4.8
422	12% Miss	4.7	2.7	0.9	≤0.1	0.3	0.4-0.5
423	Dis. EGR & O_2	57.0	99.4	42.6	6.6	3.4	4.2-5.2
424	Oil Cons.	3.0	2.9	0.8	<0.1	0.1	≤0.1
43	Unmod.	1.8	0.4	0.2	0.0	0.1	≤0.2
431	Dis. O_2	18.1	21.9	14.0	1.3-2.3	1.9	1.1-1.4
432	12% Miss	10.8	10.7	6.6	0.3	0.6	0.7-1.0
436	Dis. O_2 & RBI	30.8	64.5	28.7	4.1	3.4	3.3
434	Oil Cons.	2.1	1.5	1.1	0.0	0.1	≤0.2

As with the HC emissions, the CO emissions in the transient cycles were somewhat car dependent. With only a few exceptions, however, the NYCC and FSC results were reasonably representative of the FTP results.

The FTP and the steady-state idle CO results are resummarized as follows:

Car	FTP, g/km	Idle, %
41	1-3	0.0
	33	0.0
42	3-5	≤0.1
	56	4.5-6.5
43	2	0.0
	11	0.3
	18	1.3-2.3
	30	4.1

Except for Car 41, a reasonably good relationship appears to exist between the CO at idle and in the FTP.

The CO results for the FTP and the other steady-state modes are resummarized as follows:

Car	FTP	CO % 2500	CO % Power
41	1-3	0.0	0.0-0.4
	33	1.8	2.8-4.0
42	3.5	0.0-0.3	0.0-0.5
	56	2.4-3.4	2.9-5.2
43	2	0.1	0.0-0.2
	11	0.6	0.7-1.0
	18	1.9	1.1-1.4
	30	3.4	3.3

Again, except for the relationship being somewhat car dependent, there was a reasonably good relationship between the CO results in the FTP and in these steady-state modes.

Oxides of Nitrogen - The oxides of nitrogen results are summarized as follows:

Test No.	Description	Transient Cycles, g/km NO_x FTP	NYCC	FSC	Steady State Modes, ppm NO Idle	2500	25 mph	52 mph
41	Unmod.	0.5	0.4	0.3	25	33	135	585
411	Dis. O_2	0.3	0.3	0.3	27	26	25	220
412	12% Miss	0.3	0.4	0.2	23	9	20	180
413	Dis. EGR & O_2	0.7	0.5	0.5	19	90	290	320
415	Dis. Air & O_2	0.1	0.1	0.1	40	13	58	100
42	Unmod.	0.4	0.7	0.3	35	165	950	560
421	Dis. O_2	0.1	0.1	0.1	10	19	28	41
422	12% Miss	0.4	1.2	0.3	4	7	25	46
423	Dis. EGR & O_2	0.1	0.1	0.1	4	20	24	55
424	Oil Cons.	0.6	0.6	0.3	63	160	910	500
43	Unmod.	0.1	0.2	0.1	25	15	16	73
431	Dis. O_2	0.2	0.1	0.1	25	9	53	130
432	12% Miss	0.1	0.1	0.1	3	8	20	56
436	Dis. O_2 & RBI	0.1	0.2	0.1	4	7	15	75
434	Oil Cons.	0.1	0.2	0.1	19	3	13	64

Of interest is comparison of the oxides of nitrogen emission results for Car 42 in the unmodified configuration and with 12 percent misfire. The transient results were similar, whereas the steady-state results were considerably lower with 12 percent misfire. Analyses of the continuously recorded traces, during the FTP, SET and HFET, showed that the NO_x levels were very low for all operation with 12 percent misfire, except during periods of rapid acceleration. Relatively large NO_x emissions spikes occurred during rapid acceleration.

The NO_x results for the transient tests are resummarized for all the cars as follows:

NO_x Emissions, g/km		
FTP	NYCC	FSC
0.1-0.2	0.1-0.2	0.1-0.2
0.3-0.4	0.3-1.2	0.2-0.3
0.5-0.7	0.4-0.6	0.3-0.5

Except for the NYCC results associated with an FTP result of 0.3 to 0.4, there appears to be a relationship between the NO_x results in these cyclic procedures.

In general, there does not appear to be a relationshp between NO at idle and composite NO_x in the FTP. This lack of correlation is illustrated as follows by the considerable overlap of the data:

FTP, g/km NO_x	Idle, ppm NO
0.1-0.2	3-40
0.3-0.4	23-35
0.5-0.7	19-63

The results for the other steady-state modes are resummarized for all three cars as follows:

	ppm NO		
FTP, g/km NO_x	2500	25 mph	52 mph
0.1-0.2	3-20	13-58	41-130
0.3-0.4	9-165	25-950	180-560
0.5-0.7	33-160	135-910	220-585

VI. ANALYSES OF THE RESULTS

This section reports the analyses performed on the emissions data generated in this project. These analyses involved averaging and reformatting to enable making various comparisons of the data. Due to the very limited number of data points for each emission at each specific condition, advanced statistical analyses were judged to be inapplicable. Another limitation to further analyses was that no criteria were available to enable establishing acceptable or unacceptable concentrations of each emission in the exhaust. This precluded establishing the significance of the changes in emission levels that occurred. For example, a hundredfold increase in one emission does no necessarily represent a greater hazard that a tenfold, or possibly even lesser, increase in another emission.

Therefore, this section presents the data in formats that enable ready review and comparison. It is generally left up to the individual readers to apply their own interpretation as to the significance of the changes in the emission levels under the various operating conditions.

A. Average Values for the Unmodified Configuration

The initial analyses of the data involved averaging of the four evaluations conducted with each car in the unmodified ocnfiguration (i.e., tuned-up to manufacturers specifications). These averages, along with the maximum and minimum values, are presented in Appendix G. The average emission results, in the unmodified configuration for the three cars, are summarized in Table 13. With the exception of Car 43, hydrocarbons and carbon monoxide were almost an order of magnitude lower for the SET and HFET than for the FTP. Hydrocarbon and carbon monoxide values, for all cars in all three test cycles, were relatively low (HC less than 0.16 and CO less than 2.60 g/km).

Results for selected compounds are resummarized for the FTP as follows:

	FTP Emission Rate in mg/km		
	Car 41	Car 42	Car 43
NO_x, g/km	0.5	0.5	0.1
Particulates	15.3	5.6	10.4
Sulfate	3.1	0.2	0.2
Ammonia	6.0	11.1	60.8
Cyanides	<0.1	1.0	1.1

TABLE 13. AVERAGE VALUES FOR UNMODIFIED CONFIGURATION
In mg/km, Except as Noted

	FTP			SET			HFET		
	Car 41	Car 42	Car 43	Car 41	Car 42	Car 43	Car 41	Car 42	Car 43
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.07	0.16	0.10	0.01	0.02	0.04	0.01	0.03	0.04
Carbon Monoxide, g/km	1.30	2.60	2.09	0.03	0.56	1.28	0.03	0.21	1.53
Oxides of Nitrogen, g/km	0.47	0.52	0.11	0.69	0.36	0.08	0.75	0.35	0.06
Particulates									
Total Particulates	15.3	5.6	10.4	4.9	2.8	7.6	13.8	1.8	8.8
Sulfate	3.1	0.2	0.2	2.2	0.2	0.1	7.0	0.3	0.1
Compound Group Totals									
Aldehydes & Ketones	1.1	0.6	0.4	2.4	0.2	0.0	3.0	0.9	0.2
Individual Hydrocarbons	50.	81.	72.	11.	16.	27.	6.	10.	30.
Organic Sulfides	0.78	0.20	0.32	0.30	0.03	0.09	0.14	0.02	0.12
Organic Amines	0.03	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.03
Other Compounds									
Ammonia	6.0	11.	60.8	--	--	--	--	--	--
Cyanide & Cyanogen	0.05	1.01	1.09	--	--	--	--	--	--
Hydrogen Sulfide	0.01	0.02	0.12	0.00	0.02	0.43	0.00	0.01	0.47
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	16.	18.	11.	9.	4.	5.	6.	2.	3.

Car 41 - 1978 Ford Pinto
Car 42 - 1978 Pontiac Sunbird
Car 43 - 1978 Saab 99

Car 43 produced the lowest value for oxides of nitrogen and the highest value for ammonia. Car 41 produced the highest value for sulfate and the lowest values for ammonia and cyanide. Car 42 produced the lowest value for particulates.

B. Average Values for the Malfunction Configuration

The average values for the unmodified configuration, along with the average values for the malfunction configurations, are given in Appendix H. No method was found to further condence all of these averaged data into a single, meaningful table or figure. Therefore, various results were separated out and are discussed in the following sections.

C. Analyses of Regulated Emissions and Fuel Consumption

The analyses of the regulated emissions and fuel consumption results were straightforward since test-to-test repeatability was generally good. A summary of the regulated emissions and fuel consumption data is presented in Table 14. These data are discussed separately as follows:

FTP Regulated Emissions - The following comparisons are based on values for hydrocarbons and carbon monoxide which are four times the 1978 California light-duty emission standards. Hydrocarbon emissions exceeded one gram per kilometer in:

- Car 41 with the oxygen sensor plus the air pump disabled
- Car 42 with the oxygen sensor disabled
- Car 43 with 12 percent misfire (exceeded 2 g/km)

Carbon monoxide emissions exceeded 22 g/km in:

- Car 41 with the oxygen sensor plus the air pump disabled
- Car 42 with the oxygen sensor disabled
- Car 43 with rich best idle plus disabled oxygen sensor

Oxides of nitrogen emissions never exceeded the 1978 California standard. With the majority of the malfunctions, the NO_x either remained about the same of decreased, relative to the values in the unmodified configuration.

The values obtained for the regulated emissions, with all three cars, are compared to the 1978 California standards (0.25, 5.6, 0.93 g/km for HC, CO, NO_x) as follows:

TABLE 14. SUMMARY OF AVERAGE FTP REGULATED EMISSIONS AND FUEL CONSUMPTION DATA

	Unmodified	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Cons.	Disabled O_2 & Air Pump	Disabled O_2 & R.B.I.
Car 41, Ford Pinto							
Hydrocarbons, g/km	0.07	0.10	0.38	0.12	--	1.16	--
Carbon Monoxide, g/km	1.30	1.86	2.41	1.75	--	37.72	--
Oxides of Nitrogen, g/km	0.47	0.30	0.30	0.73	--	0.11	--
Fuel Cons., ℓ/100 km	11.1	12.0	11.2	11.8	--	11.6	--
Car 42, Pontiac Sunbird							
Hydrocarbons, g/km	0.16	1.47	1.05	1.40	0.24	--	--
Carbon Monoxide, g/km	2.60	57.50	4.71	47.58	2.95	--	--
Oxides of Nitrogen, g/km	0.52	0.13	0.37	0.16	0.58	--	--
Fuel Cons., ℓ/100 km	10.9	12.7	10.9	12.2	11.3	--	--
Car 43, SAAB 99							
Hydrocarbons, g/km	0.10	0.71	2.15	--	0.13	--	0.82
Carbon Monoxide, g/km	2.09	19.99	11.08	--	2.31	--	29.47
Oxides of Nitrogen, g/km	0.11	0.22	0.09	--	0.14	--	0.14
Fuel Cons., ℓ/100 km	10.8	11.6	13.0	--	11.8	--	11.4

Note: Values given are the average of up to four tests for the unmodified and two tests for the malfunction conditions.

	Number Exceeding 1978 California Standard						
	Unmod.	Dis. O_2	12% Mis.	Dis. EGR O_2	High Oil Cons.	Dis. O_2 & Air	Dis. O_2 & R.B.I.
Hydrocarbons	0/3	2/3	2/3	1/2	0/2	1/1	1/1
Carbon Monoxide	0/3	2/3	1/3	1/2	0/2	1/1	1/1
Oxides of Nitrogen	0/3	2/3	0/3	0/2	0/2	0/1	0/1

Fuel Consumption - Fuel consumption results, in the unmodified configuration, generally had good repeatability. These data are summarized as follows:

Car		Fuel Consumption Range, ℓ/100 km		
No.	Desc.	FTP	SET	HFET
41	Pinto	11.1-11.2	8.5-9.0	7.6-8.2
42	Sunbird	10.7-11.1	8.1-8.9	6.7-7.8
43	Saab	10.4-11.2	9.3-10.0	8.4-9.0

The percentage difference between the minimum and maximum fuel consumption for all the unmodified evaluations, were as follows:

	(Maximum/Minimum)/Average, in percent		
	FTP	SET	HFET
Lowest	1%	6%	7%
Highest	7%	9%	15%
3-car Average	4%	7%	10%

Only in the HFET evaluations with Car 42 did the overall variation in fuel consumption exceed ten percent.

Throughout the project, system operational difficulties were detected on two occasions with Car 42. Therefore, it is possible that this marginally acceptable spread in fuel consumption values may have been associated with some undetected system operational difficulties during one or more of the HFET evaluations.

D. General Effects of Malfunctions on Emissions

In this section an attempt has been made to give the reader a general idea of the effects of car and malfunction configuration on emissions. Due to the diversity of cars evaluated and the lack of established levels of significance for the unregulated emissions, it can not be established at this time whether or not any of the changes in emission levels are a definite cause of concern.

One evaluation that can provide some insight is whether the respective malfunctions caused increases in emissions relative to the unmodified configuration. The results of such an evaluation for the FTP results are summarized in Table 15.

Hydrocarbon and carbon monoxide emissions increased with essentially all of the malfunction conditions evaluated. Ammonia and cyanide increased with 75 percent of the malfunction conditions. Particulates, aldehydes, sulfides and amines increased with 40 to 60 percent of the malfunction conditions. Oxides of nitrogen, sulfate and nitrous oxide increased with less than 40 percent of the malfunction conditions. No nickel carbonyl was detected in any of the evaluations.

E. Other Elements and DMNA

An illustrative summary of the results for the elemental analyses, in the FTP evaluations, is given in Table 16. As can be determined from the data in this table, the emission levels of phosphorus, magnesium, chlorine, zinc and barium were associated with the rate of oil consumption. By qualitative X-ray analysis, it was determined that these elements were present in the oil. The following comments apply to the remainder of the compounds.

- A value of 0.2 mg/km for lead calculates out to be equivalent to less than 0.10 gram of lead per gallon of gasoline consumed.
- The lack of a lead to bromine relationship, however, indicates that the gasoline may not have been the source of the measured lead.
- Higher values of aluminum and iron generally occurred with 12 percent misfire. (With Car 41, the highest value for iron occurred with disconnected EGR).
- A value of 3 mg/km for sulfur would be equivalent to approximately 0.1 gram of sulfur per gallon of gasoline. Therefore, these measured values for sulfur are apparently associated with a system purge.

The DMNA results are summarized in Table 17. These results were based on single ion monitoring (m/e 74). With single ion monitoring, interference may result from materials having background ions of m/e 74, if at the same retention time as DMNA. In this project, provisions were made to run a full scan analyses on any samples indicating a significant value for DMNA. As shown in Table 17, however, none of the samples evaluated had significant levels of DMNA by the single ion monitoring. The highest values measured were the three samples with trace quantities. These trace quantity emission rates would be approximately equal to 0.00001 mg/km; which is considered to be an essentially negligible quantity. It should be pointed out, however, that the procedure used has not been fully qualified and may be subject to error.

TABLE 15. RELATIONSHIP OF MALFUNCTION TO UNMODIFIED EMISSION RESULTS

Regulated Emissions	Number of Cars for Which Emissions Increased Out of the Total Cars Evaluated in That Configuration					
	Disc. O_2 Sen.	12% Misfire	Disc. EGR & O_2	High Oil Cons.	Disc. O_2 & Air	Disc. O_2 & R.B.I.
Hydrocarbons, (THC), g/km	3/3	3/3	2/2	2/2	1/1	1/1
Carbon Monoxide, g/km	3/3	3/3	2/2	1/2	1/1	1/1
Oxides of Nitrogen, g/km	1/3	0/3	1/2	1/2	0/1	1/1
Particulates						
Total Particulates	2/3	2/3	12/	1/2	0/1	1/1
Sulfate	1/3	0/3	1/2	1/2	0/1	0/1
Compound Group Totals						
Aldehydes & Ketones	2/3	1/3	0/2	1/2	1/1	1/1
Individual Hydrocarbons	2/3	3/3	2/2	2/2	1/1	1/1
Organic Sulfides	1/3	0/3	1/2	1/2	1/1	1/1
Organic Amines	2/3	0/3	1/2	0/2	1/1	1/1
Other Compounds						
Ammonia	2/3	2/3	2/2	1/2	1/1	1/1
Cyanide & Cyanogen	1/3	3/3	1/2	2/2	1/1	1/1
DMNA[a]	--	--	--	--	--	--
Hydrogen Sulfide	1/3	1/3	1/2	1/2	1/1	1/1
Nickel Carbonyl	0/3	0/3	0/2	0/2	0/1	0/1
Nitrous Oxide	1/3	0/3	1/2	0/2	0/1	0/1

[a] DMNA results are reported and discussed in a separate section.

TABLE 16. ILLUSTRATIVE SUMMARY OF THE ELEMENTAL ANALYSES FOR THE FTP

	Exhaust Emissions, mg/km[b]											
	PB	Br	P	Si	Al	S	Mg	Cl	Zn	Fe	Ba	Ca
Task 1[a]	0.13	0.05				0.08		0.06	0.07	0.26		0.06
41U	0.14				0.04	2.81				0.80		
411					0.03	1.23				0.25		
412	0.16	0.07		0.03	0.08	0.37			0.03	2.99	0.06	
413	0.17			0.03	0.05	2.13		0.05	0.03	7.82	0.06	
415	0.06							0.03		0.10	0.03	
42U										0.30		0.05
421	0.09	0.07				0.03			0.02	0.25	0.03	
422		0.05		0.03	0.04	0.04				0.39	0.03	0.06
423						0.04				0.15	0.04	0.10
424			0.11				0.07	0.11	0.10	0.14	0.22	
43U	0.03			0.03	0.08	0.05		0.04	0.03	0.64	0.03	0.03
431		0.05				0.03				0.34		
432	0.20			0.08	0.17	0.14			0.04	2.71	0.05	0.07
434	0.12		0.15		0.06	0.05	0.10	0.43	0.15	0.58	0.32	0.03
436					0.04	0.05				0.40		0.03

Pb - Lead
Br - Bromine
P - Phosphorus
Si - Silicon
Al - Aluminum
S - Sulfur
Mg - Magnesium
Cl - Chlorine
Zn - Zinc
Fe - Iron
Ba - Barium
Ca - Calcium

Test	General Description
4XU	Unmodified
4X1	Disabled O_2 Sensor
4X2	12 Percent Misfire
4X3	Disabled EGR and O_2
4X4	High Oil Consumption
4X5	Disabled O_2 and Air Pump
4X6	Disabled O_2 + Rich Best Idle

[a] Maximum values are reported for the Task 1 and 3 malfunction screening evaluations.
[b] Only values greater than 0.02 are included in this table.

TABLE 17. SUMMARY OF THE DMNA RESULTS

Test No.	Configuration	DMNA[a] ng in cartridge[b]	DMNA[a] ng/m^3 in sample[c]	DMNA[a] mg/km[d]
415-1	Unmodified	ND	<0.05	0.00
412-3	12% Misfire	ND	<0.05	0.00
413-2	Dis. EGR & O_2	ND	<0.05	0.00
415-2	Dis. Air & O_2	ND	<0.05	0.00
423-1	Unmodified	ND	<0.05	0.00
421-3	Disabled O_2	ND	<0.05	0.00
422-2	12% Misfire	T	≈0.05	0.00
423-2	Dis. EGR & O_2	ND	<0.05	0.00
424-2	High Oil Cons.	T	≈0.05	0.00
432-1	Unmodified	ND	<0.05	0.00
431-3	Disabled O_2	ND	<0.05	0.00
432-2	12% Misfire	ND	<0.05	0.00
434-3	High Oil Cons.	T	≈0.05	0.00
436-2	Dis. O_2 & R.B.I.	ND	<0.05	0.00

[a] Total compounds detected using specific ion (m/e 74) monitoring; some or all of which may be DMNA.

[b] ND = not detected and T = Trace. Trace is approximately equal to 0.0025 ng in the cartridge.

[c] Values based on reported minimum detection value of 0.5 ppt in 150 litre sample.

[d] mg/km $\approx 0.00027 \times ng/m^3$ in sample

F. Maximum Emission Values

The highest of the averaged values for all three cars were determined and these data are presented in Table 18. The data listed in Table 18 are the highest of the averaged emission rates obtained with any of the three cars. These data are listed sepatately for the unmodified and for the malfunction configurations. The last two pages of Table 18 identify the car test which produced the respective maximum value.

Table 18 is intended to provide some insight into which compounds may be of potential concern. After "threshold levels for concern" are established for the unregulated emissions, this table will enable ready screening to determine which of the unregulated emissions may be of potential cause for concern; and perhaps aid in priortization for further investigation into possible hazardous toxicity effects. Further review of the results given in Appendix H, would then be required to establish whether or not concern is actually justified.

Another analysis considered was the percentage change in emission rates for each malfunction relative to the unmodified configuration. Two considerations tend to preclude the usefulness of such an analysis: One consideration was that the concentrations for some of the compounds were near the "minimum detection value." Percentage change for those compounds would be essentially meaningless. A second consideration was the previously mentioned lack of "threshold levels for concern."

G. Relative Importance of the Maximum Emission Rates

There are proposed or established automotive source emission standards for four of the compounds evaluated in this project. Such standards can be utilized in a comparative analyses of the emission results for those compounds. For most of the compounds evaluated, however, standards have not been established and attempted analyses of relative importance requires the application of some other available criteria.

The data from Table 18 were converted into units of mg/m^3 in the undiluted exhaust and these converted data are presented in Table 19. Table 19 also lists the Threshold Limit Values for those substances included in the "Registry of Toxic Effects of Chemical Substances."[7] Some additional FTP relative values for the regulated emissions are given on the following page for reference purposes. The conversion from an emissions rate in g/km to mg/m^3 was determined by the total volume of the undiluted exhaust and the total distance driven for each test. The volume of undiluted exhaust differs for each car and for each malfunction condition, generally as a function of the fuel consumption rate. For generating Table 19, and the additional FTP relative values, a relationship was used which tends to correct all data to an equivalent undiluted exhaust flow rate equal to the lowest for any of the three cars. This was done in order to equalize the data to a common basis and eliminate the relative reduction obtained by cars having high exhaust flow rates.

TABLE 18. HIGHEST OF THE AVERAGED EMISSION RATES

	Emission Rate, mg/km (Except as Noted)					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Regulated Emissions						
Hydrocarbons, g/km	0.16	2.15	0.03	1.60	0.04	1.44
Carbon Monoxide, g/km	2.60	57.50	1.28	44.97	1.53	40.50
Oxides of Nitrogen, g/km	0.52	0.73	0.69	0.81	0.75	0.84
Particulates						
Total Particulates	15.3	28.7	7.6	20.4	13.8	16.7
Sulfate	3.1	12.3	2.2	13.8	7.1	9.8
Compound Group Totals						
Aldehydes & Ketones	1.1	6.4	2.4	4.2	3.0	2.8
Individual Hydrocarbons	81.	751.	27.	529.	30.	471.
Organic Sulfides	0.78	3.23	0.30	6.04	0.14	4.56
Organic Amines	0.03	0.04	0.01	0.05	0.03	0.04
Other Compounds						
Ammonia	60.8	318.1	--	--	--	--
Cyanide & Cyanogen	1.1	66.9	--	--	--	--
DMNA	0.00	0.00	--	--	--	--
Hydrogen Sulfide	0.12	5.59	0.43	6.78	0.47	6.41
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	17.6	79.4	9.3	43.4	6.1	20.4
Aldehydes and Ketones						
Formaldehyde	0.79	1.68	2.10	0.61	2.64	0.68
Acetaldehyde	0.29	4.70	0.07	2.80	0.67	1.53
Acetone	0.04	0.40	0.02	1.67	0.03	0.47
Isobutyraldehyde	0.00	0.17	0.06	0.28	0.15	0.07
Methyl Ethyl Ketone	0.14	0.26	0.05	0.13	0.12	0.18
Hexanaldehyde	0.11	0.36	0.17	0.18	0.06	0.28
Individual Hydrocarbons						
Methane	31.50	186.09	13.56	124.88	14.07	102.60
Ethylene	12.47	215.05	3.21	147.45	3.67	110.87
Ethane	4.05	20.16	2.20	25.24	2.29	26.24
Acetylene	6.29	24.98	0.04	3.24	0.19	1.41
Propane	1.56	2.66	0.50	2.81	0.20	2.45
Propylene	6.11	79.28	1.68	88.24	1.89	99.64
Benzene	19.78	99.40	4.13	78.46	4.66	71.11
Toluene	11.55	142.33	2.09	106.44	3.30	96.11

TABLE 18 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Emission Rate, mg/km (Except as Noted)					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Organic Sulfides						
Carbonyl Sulfide	0.68	3.09	0.29	5.86	0.10	4.37
Methyl Sulfide	0.10	0.13	0.04	0.17	0.06	0.24
Ethyl Sulfide	0.02	0.07	0.00	0.10	0.00	0.13
Methyl Disulfide	0.00	0.00	0.00	0.02	0.00	0.02
Organic Amines						
Monomethylamine	0.01	0.03	0.01	0.04	0.02	0.04
Monoethylamine	0.02	0.01	0.00	0.01	0.02	0.02
Trimethylamine	0.01	0.02	0.00	0.04	0.00	0.02
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.03	0.00
Other Elements						
Chromium						
Lead	0.14	0.20				
Manganese		0.02		0.02		
Arsenic						
Mercury						
Bromine	0.02	0.07				
Phosphorus	0.02	0.15	0.01	0.17	0.01	0.10
Silicon	0.03	0.08	0.02	0.03	0.01	0.05
Cadmium						
Aluminum	0.08	0.17	0.02	0.05	0.01	0.05
Sulfur	2.81	2.13	1.07	6.77	3.93	5.84
Sodium		0.03		0.04		0.01
Fluorine						
Magnesium	0.01	0.10	0.01	0.11	0.01	0.07
Potassium		0.01		0.01		
Chlorine	0.04	0.43	0.06	0.59	0.01	0.29
Platinum						
Zinc	0.03	0.15	0.02	0.17		0.06
Copper	0.01	0.02	0.01	0.02		0.02
Nickel	0.01					
Iron	0.80	7.82	0.18	2.04	0.09	1.00
Vanadium						
Titanium						
Barium	0.03	0.32	0.03	0.33	0.02	0.20
Cesium						
Calcium	0.05	0.10	0.03	0.14	0.02	0.06
Tin						
Antimony						
Palladium						

Note: Values for all spaces left blank for "Other Elements" are 0.00.

TABLE 18 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Car Test Number					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Regulated Emissions						
Hydrocarbons, g/km	42	432	43	432	43	432
Carbon Monoxide, g/km	42	421	43	421	43	421
Oxides of Nitrogen, g/km	42	413	41	413	41	413
Particulates						
Total Particulates	41	423	43	411	41	423
Sulfate	41	413	41	411	41	411
Compound Group Totals						
Aldehydes & Ketones	41	423	41	432	41	421
Individual Hydrocarbons	42	421	43	421	43	432
Organic Sulfides	41	436	41	415	41	415
Organic Amines	41	431,436	41,42	411,431	43	436
Other Compounds						
Ammonia	43	436	--	--	--	--
Cyanide & Cyanogen	43	431	--	--	--	--
DMNA	--	--	--	--	--	--
Hydrogen Sulfide	43	436	43	436	43	436
Nickel Carbonyl	--	--	--	--	--	--
Nitrous Oxide	42	413	41	413	41	413
Aldehydes and Ketones						
Formaldehyde	41	423	41	432	41	423
Acetaldehyde	43	423	41	423	42	421
Acetone	41	421	41	432	41	421
Isobutyraldehyde	All	431	42	431	41	422
Methyl Ethyl Ketone	41	421	42	415, 421	43	415
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	42	421	41	421	42	421
Benzaldehyde	--	--	--	--	--	--
Individual Hydrocarbons						
Methane	42	421	42	421	43	421
Ethylene	42	421	43	421	43	421
Ethane	42	432	43	432	43	432
Acetylene	42	423	43	412	43	432
Propane	43	411	43	415	43	432
Propylene	42	421	43	432	43	432
Benzene	43	432	43	423	43	421
Toluene	42	421	43	432	43	432

TABLE 18 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Emission Rate, mg/km (Except as Noted)					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Organic Sulfides						
Carbonyl Sulfide	41	436	41	415	43	415
Methyl Sulfide	41	413	43	436	41	413
Ethyl Sulfide	42	436	All	415	All	415
Methyl Disulfide	All	All	All	415	All	423
Organic Amines						
Monomethylamine	41, 43	431, 436	41, 43	431, 436	43	436
Monoethylamine	41	415, 431, 432, 436	All	413, 423, 431, 434, 436	43	434
Trimethylamine	41	411	All	411	All	411, 413
Diethylamine	All	All	All	All	All	All
Triethylamine	All	All	All	All	41	All
Other Elements						
Chromium						
Lead						
Manganese		413		413		
Arsenic						
Mercury						
Bromine						
Phosphorus	43	434	41,42,43	434	41	434
Silicon	43	432	43	423,434	43	432
Cadmium						
Aluminum	43	432	41,43	432	41,43	432
Sulfur	41	413	41	413	41	413
Sodium		434		434		432,434
Fluorine						
Magnesium	41,42,43	434	41,42,43	434	42	434
Potassium		413,423,436		423		
Chlorine	43	434	43	434	41,43	434
Platinum						
Zinc	43	434	41,42	434		434
Copper	41,43	413,434	41,42	413		432
Nickel	41					
Iron	41	413	42,43	413	43	413
Vanadium						
Titanium						
Barium	43	434	42	434	42	434
Cesium						
Calcium	42	423	42	423	42	432
Tin						
Antimony						
Palladium						

Note: Values for all spaces left blank for "Other Elements" are 0.00.

TABLE 19. MAXIMUM EMISSION LEVELS IN THE UNDILUTED EXHAUST[a]

	Approximate Emission Level in Undiluted Exhaust, mg/m³[b]						TLV,[7] mg/m³
	FTP		SET		HFET		
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.	
Regulated Emissions							
Hydrocarbons	100	1,700	30	1,600	50	1,800	--
Carbon Monoxide	2,100	46,000	1,300	47,000	1,900	50,000	55
Oxides of Nitrogen	400	600	700	800	1,000	1,100	9
Particulates							
Total Particulates	12.2	23.0	8.0	21.4	17.3	20.9	--
Sulfate	2.5	9.8	2.3	14.5	8.9	12.3	--
Compound Group Totals							
Aldehydes & Ketones	1.	5.	2.	4.	4.	4.	--
Individual Hydrocarbons	65.	601.	28.	555.	44.	589.	--
Organic Sulfides	0.6	2.6	0.3	6.3	0.2	5.7	--
Organic Amines	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	--
Other Compounds							
Ammonia	48.6	254.5	--	--	--	--	35
Cyanide & Cyanogen	0.9	53.5	--	--	--	--	5[c]
DMNA	0.00	0.00	--	--	--	--	--
Hydrogen Sulfide	0.1	4.5	0.5	7.1	0.6	8.0	20[d]
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.007
Nitrous Oxide	14.	64.	10.	45.	7.6	25.5	--
Aldehydes & Ketones							
Formaldehyde	0.6	1.3	2.2	0.6	3.3	0.8	4
Acetaldehyde	0.2	3.8	<0.1	2.9	0.8	1.8	360
Acetone	<0.1	0.3	<0.1	1.7	<0.1	0.5	2400
Isobutyraldehyde	0.0	0.1	<0.1	0.3	0.2	0.1	--
Methylethylketone	0.1	0.2	<0.1	0.1	0.2	0.2	590
Hexanaldehyde	0.1	0.3	0.2	0.2	0.1	0.3	--
Individual Hydrocarbons							
Methane	25.	149.	14.	131.	18.	129.	--
Ethylene	10.	172.	3.	155.	5.	139.	--
Ethane	3.	16.	2.	27.	3.	33.	--
Acetone	5.	20.	0.	3.	0.	2.	2400
Propane	1.	2.	1.	3.	0.	3.	1800
Propylene	5.	63.	2.	93.	2.	125.	--
Benzene	16.	80.	4.	82.	6.	89.	33
Toluene	9.	114.	2.	111.	4.	120.	760
Organic Sulfides							
Carbonyl Sulfide	0.5	2.5	0.3	6.1	0.2	6.3	--
Methyl Sulfide	0.1	0.1	<0.1	0.2	0.1	0.4	--
Ethyl Sulfide	<0.1	<0.1	0.0	0.1	0.0	0.2	--
Methyl Disulfide	0.0	0.0	0.0	<0.1	0.0	<0.1	--

TABLE 19 (Cont'd). MAXIMUM EMISSION LEVELS IN THE UNDILUTED EXHAUST[a]

	Approximate Emission Level in Undiluted Exhaust, mg/m³[b]						TLV,[7] mg/m³
	FTP		SET		HFET		
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.	
Organic Amines							
Monomethylamine	<0.01	0.02	0.01	0.04	0.02	0.05	--
Monoethylamine	0.02	<0.01	0.00	0.01	0.02	0.02	--
Trimethylamine	<0.01	0.02	0.00	0.04	0.00	0.02	--
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	75
Triethylamine	0.00	0.00	0.00	0.00	0.04	0.00	100
Other Elements							
Chromium	0.00	0.00	0.00	0.00	0.00	0.00	1
Lead	0.11	0.16	0.00	0.00	0.00	0.00	0.2
Manganese	0.00	0.02	0.00	0.02	0.00	0.00	5[c]
Arsenic	0.00	0.00	0.00	0.00	0.00	0.00	0.5
Mercury	0.00	0.00	0.00	0.00	0.00	0.00	--
Bromine	0.02	0.06	0.00	0.00	0.00	0.00	0.7
Phosphorus	0.02	0.12	0.01	0.18	0.01	0.15	--
Silicon	0.02	0.06	0.02	0.03	0.01	0.08	--
Cadmium	0.00	0.00	0.00	0.00	0.00	0.00	0.2
Aluminum	0.06	0.14	0.02	0.05	0.01	0.08	--
Sulfur	2.25	1.70	1.12	7.11	6.35	8.40	--
Sodium	0.00	0.02	0.00	0.04	0.00	0.01	--
Fluorine	0.00	0.00	0.00	0.00	0.00	0.00	0.2
Magnesium	0.01	0.08	0.01	0.12	0.01	0.10	--
Potassium	0.00	0.01	0.00	0.01	0.00	0.00	--
Chlorine	0.03	0.34	0.06	0.62	0.01	0.41	3[d]
Platinum	0.00	0.00	0.00	0.00	0.00	0.00	--
Zinc	0.02	0.12	0.02	0.18	0.00	0.09	--
Copper	0.01	0.02	0.01	0.02	0.00	0.02	--
Nickel	0.01	0.00	0.00	0.00	0.00	0.00	1
Iron	0.64	6.26	0.19	0.14	0.13	1.44	--
Vanadium	0.00	0.00	0.00	0.00	0.00	0.00	--
Titanium	0.00	0.00	0.00	0.00	0.00	0.00	--
Barium	0.02	0.26	0.03	0.35	0.02	0.29	0.5[e]
Cesium	0.00	0.00	0.00	0.00	0.00	0.00	--
Calcium	0.04	0.08	0.03	0.15	0.02	0.09	--
Tin	0.00	0.00	0.00	0.00	0.00	0.00	2[f]
Antimony	0.00	0.00	0.00	0.00	0.00	0.00	0.5
Palladium	0.00	0.00	0.00	0.00	0.00	0.00	--

[a] Maximum of the average values as given in Table 17.

[b] Derived on a wet basis using the following approximate calculation:
mg/m^3 = Conversion Factor × mg/km. C.F. = Distance/Total Volume × Dilution Factor.
FTP = 0.80 SET = 1.05 HFET = 1.25

[c] Ceiling value.

[d] 0.002 for soluble salts.

[e] 0.5 for soluble compounds.

[f] 2 for inorganic compounds, 0.1 for organic compounds.

	Mass Emission Rate		Equivalent Level in FTP Raw Exhaust,[a]
	g/km	g/mi	mg/m^3
HC	0.9	1.5	700
HC	0.25	0.41	200
CO	9.3	15	7500
CO	4.4	7	3500
CO	2.1	3.4	1700
NO_x	1.2	2.0	1000
NO_x	0.6	1.0	500
NO_x	0.25	0.41	200

[a] Approximate values based on the relationship for the three cars evaluated in this project.

These data are summarized further and compared to the emission standards and the TLV in Table 20. The values summarized in Table 20 are intended to provide some possible idea of the relative importance, based on toxicity, for some of the compounds evaluated. It should be emphasized, however, that definite conclusions are currently inappropriate for any compounds; except possibly those for which automotive source emission standards have been established. It should be recognized that the hazard level of a compound may change based on new findings in health effect research. This is especially a factor when a compound is changed from a toxic concern to a carcinogenic concern; such as is apparently occurring with benzene and formaldehyde. Also, some compounds which are considered by OSHA and other agencies as being non-toxic can have a potential, indirect harmful effect (e.g., nitrous oxide is one example of such a compound due to its potential effect on the atmospheric ozone layer). The ambient air standards were also reviewed for possible inclusion in Table 20. Due to the varied ways in which the standards are expressed, however, there did not appear to be an appropriate method for using such standards in this comparative analyses.

With reference to Table 20, the maximum FTP composite emission rates for HC, CO and NO_x greatly exceeded the standards for 1983 (0.41, 3.4 and 1 g/mi for HC, CO, and NO_x). The maximum value for total particulates, however, was less than one half of the proposed 0.2 g/mi particulate standard for 1983 diesel cars.

Also, in Table 20, the maximum emission concentrations for carbon monoxide and oxides of nitrogen exceeded the TLV by over 100. Other compounds in the undiluted exhaust, which exceeded an established TLV, include benzene and ammonia. As a matter of possible interest, the value for carbon dioxide was over 20 times the established TLV.

For the remaining compounds and compound groups, it was necessary to estimate an equivalent TLV based on best available data.[7,8] Based on these

TABLE 20. RELATIVE IMPORTANCE OF MAXIMUM EMISSION RATES

	Maximum Emission Rate (MER) in mg/km	Emission Standard for 1983 in mg/km	Equivalent MER in Undiluted Exhaust in mg/m^3 (MEC)	Threshold Limit Value (TLV) in mg/m^3 OSHA(7)	R[c]	Ratio of MEC to TLV
Regulated Emissions						
Hydrocarbons	2,150[a]	255	1,700	--	--	--
Carbon Monoxide	57,500[a]	2,113	46,000	55	--	836
Oxides of Nitrogen	730[a]	622[b]	600	9	--	67
Particulates						
Total Particulates	29[a]	124[d]	23	--	1	23
Sulfate	14	--	15	--	1	15
Compound Group Totals						
Aldehydes & Ketones	6	--	5	--	--	--
Organic Sulfides	6	--	6	--	10	<1
Organic Amines	<1	--	<1	--	>10	<1
Other Compounds						
Ammonia	318	--	254	35	--	7
Cyanide & Cyanogen	67	--	54	--	5	11
Hydrogen Sulfide	7	--	8	--	10	<1
Nickel Carbonyl	0	--	0	0.007	--	0
Nitrous Oxide	80	--	64	--	--	--
Formaldehyde	3	--	3	4	--	<1
Benzene	99	--	89	33	--	3

---

[a] FTP rate recorded for the regulated emissions and total particulates

[b] 255 mg/km in California

[c] Based on values for some similar or Related compounds as set by OSHA(7) or Recommended by the 1968 American Conference of Governmental Industrial Hygienists(8)

[d] Proposed for Diesel cars

estimated values, the maximum levels for total particulates, sulfate and cyanide were above the estimated values for an equivalent TLV for factors of 23, 15 and 11, respectively.

In summary, these comparisons of the emissions results with the TLV's are only intended to provide some relative means of interpreting the data obtained in this project. These relative comparisons generally apply only to toxicity and the hazardous characteristic on an individual component basis. Other areas, such as carcinogenicity and cumulative, synergistic and indirect effects, must be considered before any definite conclusions can be made.

LIST OF REFERENCES

1. Urban, Charles, "Regulated and Unregulated Exhaust Emissions from Malfunctioning Non-Catalyst and Oxidation Catalyst Gasoline Automobiles." Final Report to Environmental Protection Agency under Contract No. 68-03-2499, January 1980.

2. Dietzmann, Harry E., et al. "Analytical Procedures for Characterizing Unregulated, Pollutant Emissions from Motor Vehicles", Report EPA 600/2-79-017, February 1979.

3. Code of Federal Regulations, Title 40, Chapter 1, Part 85, Subpart H, Sections applicable to 1978 Model Year Light-Duty Vehicles.

4. Congested Freeway Driving Schedule (Appendix VIII in the Recommended Practice for Measurement of Exhaust Sulfuric Acid Emission from Light-Duty Vehicles and Trucks, November 1976).

5. Highway Fuel Economy Driving Schedule (Federal Register, Vol. 41, No. 100, May 21, 1976, Appendix I).

6. 55 mph Alternate Mileage Accumulation Procedure (MSAPC A/C No. 37, December 20, 1973, Enclosure 1).

7. U.S. HEW "Registry of Toxic Effects of Chemical Substances", 1976 and 1978 Editions.

8. Proceedings of the 1968 American Conference of Governmental Industrual Hygienists as reported in the Fifth Edition of the "Matheson Gas Data Book."

APPENDICES

A - General Information
B - Task I Malfunction Screening Evaluations
C - Summaries of the Results
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APPENDIX A-1. MODIFIED DURABILITY DRIVING SCHEDULE FOR MILEAGE ACCUMULATION ON PUBLIC ROADS

The following schedule is shown on Figure A-1:

1. Leave Institute Fleet Laboratory

2. Proceed to CULEBRA ROAD via INSTITUTE ROAD, 20 & 30 m.p.h.

3. Stop at CULEBRA

4. Left turn onto CULEBRA and proceed to "A", 410, at 40 m.p.h. (Distance from Fleet Laboratory to "A" is 2.3 miles)

5. Stop at "A", idle 15 sec.

6. Start lap prompter at 1.

7. Accelerate from stop, turn left on access road

8. After left turn, accelerate to lap speed and then decelerate at "B" to 20 m.p.h., as traffic permits.

9. Accelerate to lap speed as you turn onto 410. Continue on 410 to next exit and then decelerate at "C" to 20 m.p.h., as traffic permits then accelerate to lap speed.

10. Continue on FRONTAGE ROAD until a full stop can be safely made at area of point "D". Idle for 15 secs.

11. Accelerate from stop to lap speed and pull onto 410 at next ramp. Continue on 410 to next exit ramp.

12. Take exit, then decelerate to 20 m.p.h., at "E".

13. Accelerate to lap speed.

14. Stop at "F" and idle 15 secs.

15. Accelerate to lap speed and continue to "G". Decelerate to 20 m.p.h., at "G" then accelerate to lap speed.

16. Stop at traffic light if red, "H" (this can be as long as 33 secs.) If the light is green, proceed and make an additional stop along the North lap as traffic permits.

17. As you pass "H" stop light, push the "lap" prompter and observe the "lap speed".

18. Left turn on MARBACH under 410. Stop at light "I". If light is green, proceed on North lap and make additional stop as traffic permits.

19. Left turn to 410 across at "I".

APPENDIX A-1 (CONT'D). MODIFIED DURABILITY DRIVING SCHEDULE FOR MILEAGE ACCUMULATION ON PUBLIC ROADS

20. Proceed up 410 to "J" at lap speed.

21. Decelerate at "J" to 20 m.p.h., and then accelerate to lap speed.

22. Continue to "K" at lap speed.

23. Decelerate at "K" to 20 m.p.h., and then accelerate to lap speed.

24. Take ramp to 410 and proceed up 410 to exit ramp at "L".

25. Decelerate at "L" to 20 m.p.h., then accelerate to lap speed.

26. Proceed to "M", then stop and idle 15 secs.

27. Accelerate to lap speed then decelerate at "N" to 20 m.p.h., and then accelerate to lap speed.

28. Take ramp to 410 and continue on 410 to CULEBRA exit ramp.

29. Take CULEBRA exit to stop at "A". Idle 15 secs.

30. Push "lap" prompter for next lap and lap speed.

31. This begins the 3rd lap.

32. Continue with South lap - North lap sequence until lap number 9 is complete.

33. Lap number 10 is run at a steady 55 m.p.h., on 410. Get on 410 at first entrance ramp following the stop at the end of lap number 9 and stay on 410.

34. Lap 10 is completed when you stop at "A" or "H" after pulling off onto the ramp nearest the stop.

35. After stop at "A" or "H" Lap Number 10 is complete.

36. Punch lap button for Lap 11.

37. Accelerate then stop at "B".

38. Accelerate to lap speed then decelerate to stop at "D".

39. Accelerate to lap speed then decelerate to stop at "F".

40. Accelerate to lap speed then decelerate to stop at "H".

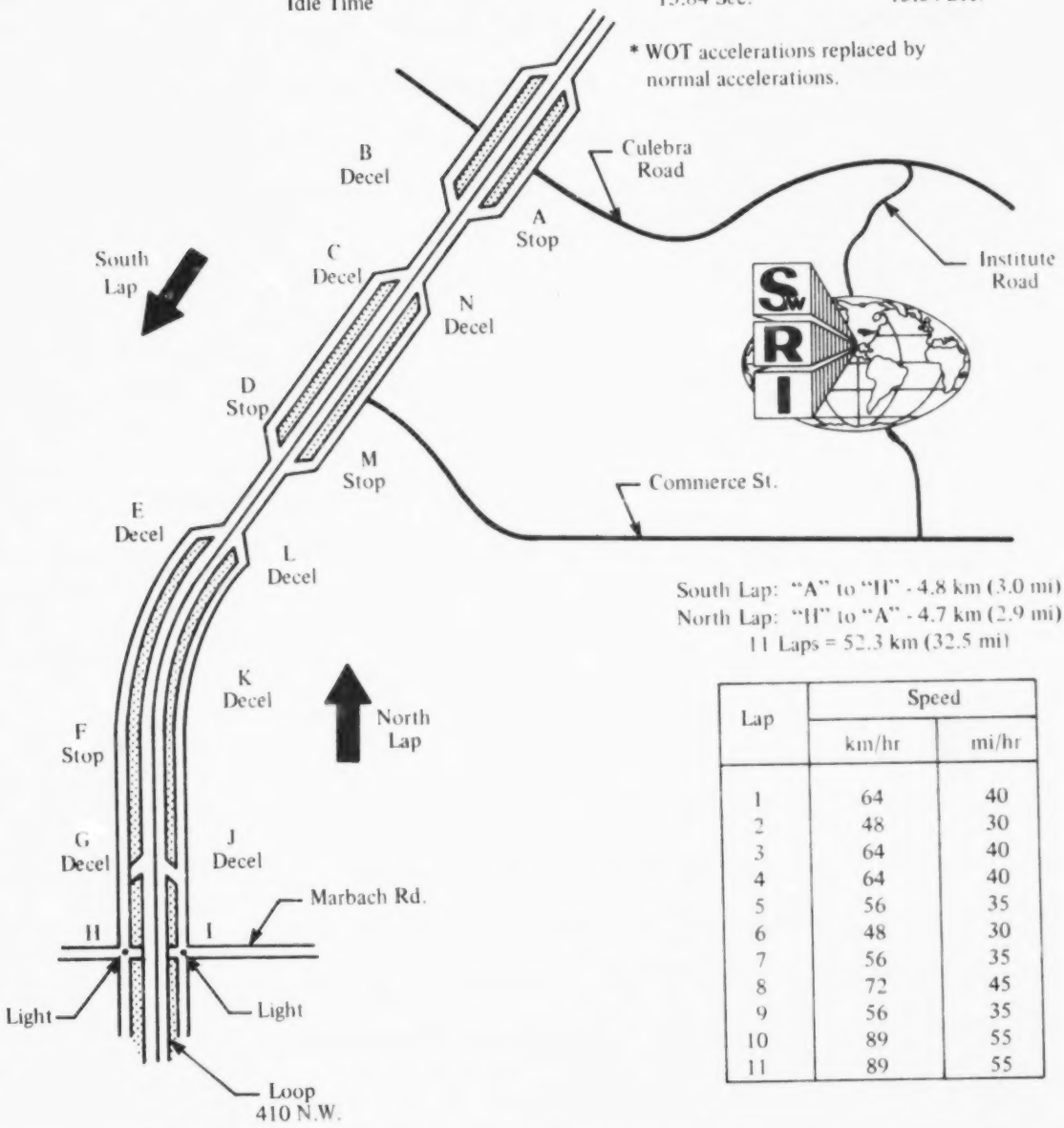
41. This completes one cycle of the mileage accumulation.

42. The next cycle of the schedule begins at "H".

43. Complete as many steps per shift as time will allow, then return to Fleet Laboratory.

Driving Mode	Events Per Mile, 55 mph Top Speed: SwRI Course*	AC No. 37
Stops	1.02	1.01
Normal Accelerations from Stop	1.01	0.91
Normal Accelerations from 20 mph	1.11	1.11
Wide-Open Throttle Accelerations and Fast Deceleration	0.00	0.10
Idle Time	13.84 Sec.	13.64 Sec.

* WOT accelerations replaced by normal accelerations.



South Lap: "A" to "H" - 4.8 km (3.0 mi)
North Lap: "H" to "A" - 4.7 km (2.9 mi)
11 Laps = 52.3 km (32.5 mi)

Lap	Speed	
	km/hr	mi/hr
1	64	40
2	48	30
3	64	40
4	64	40
5	56	35
6	48	30
7	56	35
8	72	45
9	56	35
10	89	55
11	89	55

Figure A-1. Modified (automobile) durability driving schedule for mileage accumulation on public roads.

APPENDIX A-2. SHORT-TEST SEQUENCE AND PROCEDURES

DILUTE EMISSIONS TESTING - CVS

1. Check Inertia and Horsepower (Set same settings as for FTP)
2. Run 505 Seconds of the FTP
3. Idle 6 minutes in Neutral with Fan On
4. Run NYCC and take bag sample
5. Idle 6 minutes in Neutral with Fan On
6. Run FSC and take bag sample at flow rate of 1 cfm

RAW EMISSIONS TESTING - HC by NDIR and NO by CL for Undiluted Emissions

7. Idle 6 minutes in Neutral with Fan On
8. Run TWO SPEED IDLE TEST (TSIT) - 3 minutes total at each condition

   a. 2500 rpm in Neutral - measure during minutes 2 through 3
   b. Normal Idle in Neutral - measure during minutes 2 through 3

9. Continue Normal Idle for 6 minutes Total
10. Set Inertia at 1750
11. RUN FEDERAL THREE MODE (FTM)

    Minute 1 - set____[a] Horsepower at 52 mph
    2 - Stabilize
    3 - Measure Emissions

    Minute 4 - Set____[a] Horsepower at 25 mph
    5 - Stabilize
    6 - Measure Emissions

    Minute 7 - Idle in Neutral
    8 - Stabilize
    9 - Measure Emissions

[a] Horsepower from a table based on NADA weight + 400 lbs:

Car	NADA + 400	Horsepower setting at 25 mph	Horsepower setting at 52 mph
41	2740	6.0	14.5
42	3060	6.5	13.5
43	2880	6.5	14.5

Federal Short Cycle (FSC)

Within two hours of the FTP, SET or HFET emissions evaluations, precondition the engine by driving the first 505 seconds of the FTP Driving Sequence. With the fan left on and the hood left open, immediately follow the 505 with six (6) minutes (± 1 minute) of operation at idle with the transmission in neutral. Immediately following the six minutes of idle, begin the Federal Short Cycle which is described as follows:

Mode	Time in mode (secs)
0-16 mph acceleration	6
16-29 mph acceleration	23
29 mph cruise	10
29-37 mph acceleration	18
37-42 mph acceleration	4.5
42-37 mph deceleration	2.5
37-20 mph deceleration	32
20-0 mph deceleration	7.5
Idle	21.5
	125.0 seconds total

The dynamometer loadings and transmission shift points follow the procedure as required for the FTP. A minimum of 2 cu. ft. of sample exhaust is required in the sample bag.

Two-Speed Idle Test (TSIT)

This short test consists of volumetric sampling of undiluted exhaust emissions during two steady-state operating conditions with the hood open and the cooling fan on. The first operating mode is 2500 engine rpm with the transmission in neutral. The second mode is normal idle with the transmission in neutral.

Two Speed Idle Tests shall be preceded by a six minute idle period as described under the Federal Short Cycle. At the end of the idle period the vehicle will be operated for a maximum of three minutes at 2500 rpm and then at idle speed. At each speed, equilibrium of engine speed and the CO, HC and NO analyzer output meters shall be maintained for 30 seconds before the readings are recorded. CO, HC and NO shall be measured and reported in % CO, ppm/Hexane and ppm NO, respectively.

Federal Three Mode Test (FTM)

This short test consists of three steady-state operating modes (similar to Clayton Key Mode) from which undiluted exhaust samples are taken with the dynamometer loads simulating the average power which occurs at the appropriate speed on the FTP with all light-duty vehicles being grouped into weight classes. The test will be conducted with the vehicle's hood open and auxiliary cooling fan in-use. The inertia weight setting is 1750 pounds and the road load settings for the 25 and 52 mph speeds are determined from a chart.

The FTM test procedure is preceded by a six minute idle period as described under the Federal Short Cycle. At the end of the idle period the vehicle will be operated for a maximum of three minutes at the Mode specified speed. During the first two minutes in each mode the specified dynamometer load horsepower shall be set and the system shall reach stabilization. The test shall per performed in the order of high cruise, low cruise, and idle. At each speed, equilibrium of vehicle speed and the CO, HC and NO analyzer meters shall be maintained for 30 seconds before the readings are recorded. CO, HC and NO shall be measured by the volumetric procedure and reported in % CO, ppm/Hexane and ppm NO respectively.

APPENDIX A-3. CALCULATIONS FOR UNREGULATED EMISSIONS

This appendices documents the calculation methods used for the unregulated emissions. All values not defined (i.e., CVS FLOW, VOL, etc.) are obtained from the computer printouts for the regulated emissions. Example printout is included as Table 1.

A. Individual Hydrocarbons, Nickel Carbonyl, N_2O and H_2S

1. For FTP Evaluations only, convert 2-Bag UDDS to Equivalent 1-Bag UDDS

$$\text{PPM 12} = \frac{\text{PPM}_1 \times \text{CVS FLOW}_1 + \text{PPM}_2 \times \text{CVS FLOW}_2}{\text{CVS FLOW}_1 + \text{CVS FLOW}_2}$$

$$\text{PPM 34} = \frac{\text{PPM}_3 \times \text{CVS FLOW}_3 + \text{PPM}_4 \times \text{CVS FLOW}_4}{\text{CVS FLOW}_3 + \text{CVS FLOW}_4}$$

2. Convert PPM to $\mu g/m^3$:

$$\mu g/m^3 = 35.32 \times \text{DENSITY} \times \text{PPM}$$

	Density, g/ft^3		
Methane CH_4	- 18.86	Propane C_3H_8	- 17.29
Ethylene C_2H_4	- 16.50	Propylene C_3H_6	- 16.50
Ethane C_2H_6	- 17.68	Benzene C_6H_6	- 15.33
Acetylene C_2H_2	- 15.33	Toluene C_7H_8	- 15.49
H_2S	- 40.12	N_2O	- 51.82
NH_3	- 20.05	$Ni(CO)_4$	- 200.99

B. Calculation of mg/km

$$\text{mg/km} = ((\text{EXH} \times \text{SCF} - \text{GC} \times \text{DFC}) \times \text{VOL} \div \text{KM}) \div 100$$

- Calculations were performed using a Hewlett-Packard HP-65 Programmable Calculator
- Dry (DC) and (SCF) was used for all unregulated emissions except: IHC, N_2O and $Ni(CO)_4$
- DFC and SCF are obtained from the computer printout for regulated emissions. (See Tables 1 and 2.)

C. Metals and Other Elements

$$\text{COMPONENT WEIGHT ON FILTER} = \mu g/cm^2 \times \text{EFF. FILTER AREA}$$

$$\text{EFF. FILTER AREA} = 14.3\ cm^2$$

$$\text{COMPONENT } \mu g/m^3 = \text{C.W.O.F.} \div \text{TOTAL WT.} \times (\mu g/m^3 \text{ for Total Wt.})$$

D. Calculation of Average Temperature and Oxygen

$$\text{Average} = \frac{\text{INTEGRATOR COUNTS}}{6.944 \times \text{SECONDS}} \times \text{FULL SCALE VALUE}$$

= % For Oxygen

= MV for Catalyst Temperature

E. Calculation for 4-FTP

Composite 4-FTP = 0.43×(Value for 1&2) + 0.57×(Value for 3&4)

APPENDIX A-3 (CONT'D). CALCULATIONS FOR UNREGULATED EMISSIONS

TABLE 1. COMPUTER PRINTOUT NOMENCLATURE FOR FOUR-BAG FTP

```
                                    PVM -        FTP  VEHICLE EMISSIONS RESULTS - MALFUNCTION CONDITION
                                                      PROJECT

TEST NO.              RUN                          VEHICLE NO.                          TEST WEIGHT        KG(        LBS)
VEHICLE MODEL                                      DATE                                 ACTUAL ROAD LOAD       KW(        HP)
ENGINE      L(     CID)                            BAG CART NO.                         GASOLINE  EM.
TRANSMISSION A3                                    DYNO NO.                             ODOMETER        KM(        MILES)
GVW        KG(        LBS)                         CVS NO.

BAROMETER          MM HG(       IN HG)             DRY BULB TEMP.      DEG C(      DEG F)
RELATIVE HUMIDITY     PCT                          ABS. HUMIDITY      GM/KG                NOX HUMIDITY CORRECTION FACTOR
BAG RESULTS
   BAG NUMBER                                          1                  2                  3                  4
   DESCRIPTION                                   COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)
   BLOWER INLET P MM. H2O(IN. H2O)
   BLOWER INLET TEMP. DEG. C(DEG. F)
   BLOWER REVOLUTIONS
   CVS FLOW STD. CU. METRES(SCF)
   HC  SAMPLE METER/RANGE/PPM
   HC  BCKGRD METER/RANGE/PPM
   CO  SAMPLE METER/RANGE/PPM
   CO  BCKGRD METER/RANGE/PPM
   CO2 SAMPLE METER/RANGE/PCT
   CO2 BCKGRD METER/RANGE/PCT
   NOX SAMPLE METER/RANGE/PPM
   NOX BCKGRD METER/RANGE/PPM
   DILUTION FACTOR

   HC  CONCENTRATION PPM
   CO  CONCENTRATION PPM
   CO2 CONCENTRATION PCT
   NOX CONCENTRATION PPM
   HC  MASS GRAMS
   CO  MASS GRAMS
   CO2 MASS GRAMS
   NOX MASS GRAMS

   HC  GRAMS/KM
   CO  GRAMS/KM
   CO2 GRAMS/KM
   NOX GRAMS/KM
   FUEL CONSUMPTION BY CB L/100KM

   RUN TIME              SECONDS
   AVG. EXH. OXYGEN      PERCENT
   CATALYST AVG. TEMP.   DEG. C
   CATALYST MAX. TEMP.   DEG. C
   MEASURED DISTANCE     KM
        DEC, WET (DRY)
        SCF, WET (DRY)
        VOL (SCM)
        KM  (MEASURED)

COMPOSITE RESULTS                                                                                  3-BAG        (4-BAG)
   TEST NUMBER                      TOTAL FUEL SULFUR    MG/KM          CARBON DIOXIDE      G/KM                  (       )
   BAROMETER     MM HG              AVG. EXH. OXYGEN     PCT            FUEL CONSUMPTION    L/100KM               (       )
   HUMIDITY      G/KG               CATALYST AVG. TEMP.  DEG C          HYDROCARBONS (THC)  G/KM                  (       )
   TEMPERATURE   DEG C              CATALYST MAX. TEMP.  DEG C          CARBON MONOXIDE     G/KM                  (       )
                                                                        OXIDES OF NITROGEN  G/KM                  (       )
```

APPENDIX A-3 (CONT'D). CALCULATION FOR UNREGULATED EMISSIONS
TABLE 2. DEFINITION OF COMPUTER PRINTOUT NOMENCLATURE

FOR FOUR-BAG AND SINGLE-BAG

REGULATED EMISSIONS

The following are primarily exerpts taken from the computer program:

AVG. EXH. OXYGEN: Direct printout of an input

CATALYST AVG. AND MAX. TEMPS.: Input converted to °C and printed-out

```
C   DFC = DILUTION FACTOR CORRECTION  DFC = FOR WET SAMPLES  DFCD = FOR DRY

    DF(J)=13.4/(  YC2(2,J) +(( YH(2,J) + CC(2,J))/10000.))
    DFC(J) = 1 - 1/DF(J)

C   CALCULATE DFC, VOL. KM FOR BAGS 1+2 AND 3+4
C   DF = TOTAL CVS FLOW / EXHAUST FLOW = AIR + EXH / EXH
C   DFC = 1 - 1/DF = 1 - EXH/(AIR+EXH) = AIR/(AIR+EXH)
    DFC12 =(DFC(1)*VMIX(1) + DFC(2)*VMIX(2)) / (VMIX(1) + VMIX(2))
    DFC34 = (DFC(3)*VMIX(3) + DFC(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
    IF(RH.LT.20) RH = 20
    DFCD12 = DFC12 * (1.0 - 0.000323*(RH - 20))
    DFCD34 = DFC34 * (1.0 - 0.000323*(RH - 20))

C   SCF = SAMPLE CORRECTION FACTOR FOR WATER REMOVAL   SCF = FOR WET  SCFD=DRY
    SCF12 = 1.000
    SCF34 = 1.000
    SCFD12 = (SCFD(1)*VMIX(1)+SCFD(2)+VMIX(2)) / (VMIX(1) + VMIX(2))
    SCFD34 = (SCFD(3)*VMIX(3)+SCFD(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
```

TOTAL FUEL SULFUR:

```
C   TFS = TOTAL FUEL SULFUR IN MG/KM
C   TFS = L/100KM * PCT  * G/ML * 1000ML/L * 0.01G/GPCT * 1000MG/G

    TFS = CBFM   * FSWPCT * FPPG * 100.

C   CALCULATE 4-BAG EMISSIONS AND FUEL CONSUMPTION
C   4-BAG = 0.43*(BAG1+BAG2)/(MILES1+MILES2)+0.57*(BAG3+BAG4)/(MILES3+MILES4)

    DISTA=MILES(1) + MILES(2)
    DISTB=MILES(2) + MILES(3)
    DISTC=MILES(3) + MILES(4)

    HCWM4 = 0.43*((HCM(1)+HCM(2)) / DISTA) + 0.57*((HCM(3)+HCM(4)) / DISTC)
    COWM4 = 0.43*((COM(1)+COM(2)) / DISTA) + 0.57*((COM(3)+COM(4)) / DISTC)
    CO2WM4= 0.43*((CO2M(1)+CO2M(2))/DISTA) + 0.57*((CO2M(3)+CO2M(4)) / DISTC)
    NOXWM4= 0.43*((NOXM(1)+NOXM(2))/DISTA) + 0.57*((NOXM(3)+NOXM(4)) / DISTC)
    CBFE4 = 2421. / (.866*HCWM4 + .429*COWM4 + .273*CO2WM4)
```

APPENDIX A-4. ANALYTICAL PROCEDURE FOR DMNA

The following description of the analytical procedure for DMNA was excerpted from a copy of the Special Interim Technical Report for EPA Contract No. 68-02-2767. The Interim Report was prepared by Dr. E. D. Pellizzari of the Research Triangle Institute for Dr. Ron Bradow of the Environmental Protection Agency, Research Triangle Park. The procedure described was used by the Research Triangle Institute in performing the DMNA analyses reported in this final report.

ANALYSIS FOR N-NITROSODIMETHYLAMINE IN EXHAUST GASES USING A TENAX GC CARTRIDGE AND GAS CHROMATOGRAPHY/MASS SPECTROMETRY/COMPUTER

EPA Contract No. 68-02-2767

TRI/1515/00-01S

N-NITROSODIMETHYLAMINE IN AMBIENT AIR
ANALYTICAL METHOD

Analyte:	DMN	Method No:	
Matrix:	Air	Range:	0.5 ppt - 10 ppb
Procedure:	Absorption on Tenax GC, thermal desorption with He purge, measurement by capillary gas-liquid chromatography/ mass spectrometry	Precision:	±10%
Date Issued:		Classification:	E(Proposed)
Date Revised:			

---

1. Principle of the Method

N-nitrosodimethylamine (DMN) is concentrated from ambient air on Tenax GC in a short glass tube (1,2). It is desorbed by heating and purging with helium into a liquid nitrogen cooled nickel capillary trap and then introduced into a high resolution gas chromatographic column where it is separated from interferences. The concentration of DMN is measured from the mass spectrometric signal at m/3 74 (3).

2. Range and Sensitivity

2.1 The range of the mass spectrometric signal for the conditions listed corresponds to 0.5 ppt to 10 ppb.

2.2 A concentration of 0.5 ppt of DMN can be determined in a 150-liter air sample.

3. Interferences

Interferences may result from materials having background ions of m/e 74 ($C_2H_8N_3$, $C_2H_4NO_2$, $C_2H_6N_2O$, C_3H_3Cl, C_3H_6S, C_3H_6O, or $C_3H_{10}N_2$) if at the same retention time of DMN.

4. Precision and Accuracy

4.1 The precision of this method has been determined to be ±10% of relative standard deviation when replicate sampling cartridges were spiked with 50 ng (corresponding to 10 ppb in 150 ℓ of air). These data were obtained using 10.0 cm long glass tubes (1.5 cm i.d.) packed with 35/50 mesh of Tenax GC (bed dimensions: 1.5 cm x 6 cm in depth).

4.2 The accuracy of the analysis is approximately ±10% of the amount reported as determined from repeated analysis of several standards.

5. Advantages and Disadvantages of the Method

5.1 The gas chromatography-mass spectrometry technique interfaced with a Finnigam glass jet separator (Model 01512-42158 Finnigan Corp., Sunnyvale, CA) is extremely sensitive and specific for the analysis of DMN. The high resolution gas chromatographic separation yields a retention time that is characteristic for DMN, and relatively specific for positive assignment of the signal as DMN. The mass spectormeter in combination with high resolution gas chromatography yields a very high degree of specificity. The base peak of DMN is at m/e 74 which is also the parent ion. In order to assign the signal at m/e 74 to DMN it is absolutely necessary that the retention time matches with the signal.

5.2 Collected samples can be stored up to 1 month with less than 10% losses.

5.3 Because DMN is a suspected carcinogen in man it is extremely important to exercise safety precautions in the preparation and disposal of liquid and gas standards, cleaning of used glassware, etc., and the anlaysis of air samples.

5.4 Since the mass spectrometer can not be conveniently mobilized, sampling must be carried out away from the instrument.

5.5 High resolution gas chromatography/low resolution mass spectrometry is not a convenient technique for handling a large number of samples (>100/wk).

5.6 Efficiency of air sampling increases as the ambient air temperature decreased (i.e. sensitivity increases).

5.7 Ambient air sampling is limited to cases where the NO_x levels are less than 3 ppm when dimethylamine is also present.

APPENDIX B

Malfunction Screening Evaluations

TABLE B-1. SUMMARY OF THE MALFUNCTION SCREENING AVERAGE COMPOSITE FTP RESULTS mg/km (Except as Noted)

		Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number,	PVMT-R	Low	High	Avg.	42B2	42C1	42C2	42D1	42D2	42E1	42F2	42G2
Barometer,	mm, Hg	738.9	741.7	740.5	743.5	743.2	742.2	743.7	739.4	742.7	742.7	738.6
Humidity,	g/kg	8.9	10.5	9.9	8.2	11.6	8.3	8.5	9.8	9.7	11.8	9.4
Temperature,	°C	21.1	22.8	22.1	22.8	22.8	21.1	20.6	22.2	22.2	22.2	21.7
Total Fuel Sulfur,	mg/km	23.02	24.97	24.15	26.64	23.74	26.40	25.14	30.06	23.78	28.86	29.36
Avg. Exh. Oxygen,	%	--	--	--	--	--	--	--	--	--	--	--
Catalyst Avg. Temp.,	°C	400.	416.	408.	338.	402.	329.	525.	495.	435.	329.	342.
Catalyst Max. Temp.,	°C	508.	525.	518.	431.	504.	423.	661.	637.	513.	397.	414.
Carbon Dioxide,	g/km	246.6	267.3	258.5	214.0	255.5	194.9	256.5	224.9	258.2	207.0	216.0
Fuel Cons.,	ℓ/100 km	10.74	11.65	11.26	12.43	11.08	12.32	11.73	14.02	11.09	13.47	13.70
Regulated Emissions												
Hydrocarbons	g/km	0.23	0.25	0.24	1.40	0.17	1.60	1.76	8.00	0.17	2.02	1.54
Carbon Monoxide	g/km	2.76	3.37	3.01	46.35	2.19	56.46	8.10	49.82	0.72	64.95	63.65
Oxides of Nitrogen	g/km	0.37	0.43	0.40	0.15	0.77	0.16	0.24	0.11	0.75	0.29	0.25
Particulates												
Total Particulates		3.32	8.76	5.53	23.77	6.71	17.91	12.57	16.67	5.42	24.95	6.74
Sulfate		0.33	1.07	0.69	0.21	0.52	0.42	0.22	1.97	0.63	0.69	0.17
Sulfate as % of TFS,	%	0.44	1.51	0.97	0.26	0.73	0.53	0.29	2.16	0.88	0.80	0.19
Compound Group Totals												
Aldehydes and Ketones		1.8	3.9	3.2	4.3	7.3	8.9	6.7	5.9	4.2	0.7	3.2
Individual Hydrocarbons		--	--	--	--	--	--	--	--	--	--	--
Organic Sulfides		0.06	0.18	0.10	0.70	0.14	1.48	1.38	2.37	0.07	0.36	0.23
Organic Amines		0.00	0.13	0.03	--	0.08	0.13	0.07	0.02	0.03	0.00	0.02
Other Compounds												
Ammonia		3.53	3.64	3.59	--	18.18	139.96	27.36	--	--	--	--
Cyanide and Cyanogen		1.83	1.97	1.90	10.15	1.79	17.82	10.07	--	--	--	--
DMNA		--	--	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide		0.02	0.72	0.25	0.62	0.00	0.46	1.18	7.73	--	0.49	0.47
Nickel Carbonyl		0.00	0.00	0.00	--	--	--	--	--	0.00	0.00	0.00
Nitrous Oxide		--	--	--	--	--	--	--	--	--	--	--

TABLE B-1 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING AVERAGE COMPOSITE FTP RESULTS mg/km (Except as Noted)

	Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number, PVM-ST	Low	High	Avg.*	42B2	42C1	42C2	42D1	42D2*	42E1	42F2	42G2
Aldehydes and Ketones											
Formaldehyde	0.79	1.42	1.10	1.05	1.59	1.42	1.47	1.01	2.35	0.12	1.09
Acetaldehyde	0.17	1.48	0.91	2.90	2.41	4.33	2.47	3.25	1.00	0.00	1.36
Acetone	0.00	0.44	0.26	0.37	0.62	1.14	0.17	0.45	0.26	0.00	0.37
Isobutyraldehyde	0.00	0.09	0.02	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00
Methyl Ethyl Ketone	0.15	1.50	0.77	0.00	2.59	1.44	2.55	0.84	0.23	0.06	0.16
Crotonaldehyde	--	--	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.11	0.23	0.17	0.00	0.09	0.61	0.00	0.07	0.32	0.48	0.18
Benzaldehyde	--	--	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	1.8	3.9	3.2	4.3	7.3	8.9	6.7	5.9	4.2	0.7	3.2
Total as % of THC, %	0.8	1.7	1.4	0.3	4.3	0.6	0.4	0.1	2.5	0.0	0.2
Individual Hydrocarbons											
Methane	--	--	--	--	--	--	--	--	--	--	--
Ethylene	--	--	--	--	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--	--	--	--	--
Acetylene	--	--	--	--	--	--	--	--	--	--	--
Propane	--	--	--	--	--	--	--	--	--	--	--
Propylene	--	--	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--	--	--	--	--
Total Individual HC	--	--	--	--	--	--	--	--	--	--	--
Total as % of THC, %	--	--	--	--	--	--	--	--	--	--	--
Organic Sulfides											
Carbonyl Sulfide	0.03	0.18	0.08	0.70	0.11	0.48	1.36	2.37	<0.01	0.33	0.19
Methyl Sulfide	<0.01	0.06	0.02	0.00	0.03	0.00	0.02	0.00	0.07	0.03	0.04
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00
Organic Amines											
Monomethylamine	0.00	0.05	0.01	--	0.06	0.07	0.05	0.00	0.02	0.00	0.00
Monoethylamine	0.00	0.08	0.02	--	0.02	0.06	0.02	0.00	0.01	0.00	0.02
Trimethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-1 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING AVERAGE COMPOSITE FTP RESULTS mg/km (Except as Noted)

		Unmodified 42A1			w/o 02	Disabled EGR w. 02	Disabled EGR w/o 02	12% Misfire w. 02	12% Misfire w/o 02	Full Lean	Rich Idle w/o 02	Max. Rich
Test Number, PVM-ST		Low	High	Avg.	42B2	42C1	42C2	42D1	42D2	42E1	42F2	42G2
Trace Elements[a]												
Chromium	Cr											
Lead	Pb		0.11	0.05	0.09		0.13		0.05	0.09		
Manganese	Mn	0.02	0.05	0.07	0.06	0.06	0.05	0.06	0.06	0.08	0.01	0.04
Arsenic	As											
Mercury	Hg											
Bromine	Br		0.04	0.02	0.05			0.03	0.04		0.03	
Phosphorus	P	0.01	0.02	0.01	0.01		0.01	0.02	0.02	0.03	0.02	0.01
Silicon	Si								0.01			
Cadmium	Cd		0.01	0.01								
Aluminum	Al		0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01
Sulfur	S	0.02	0.04	0.03	0.02	0.02	0.03	0.04	0.08	0.03	0.04	0.02
Sodium	Na											
Fluorine	F											
Magnesium	Mg									0.01		
Potassium	K											
Chlorine	Cl	0.01	0.03	0.02	0.01	0.02	0.01	0.06	0.05	0.02	0.02	0.02
Platinum	Pt											
Zinc	Zn	0.01	0.07	0.03	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.01
Copper	Cu	0.02	0.04	0.03			0.03		0.03	0.03		
Nickel	Ni											
Iron	Fe	0.06	0.15	0.09	0.10	0.10	0.18	0.21	0.24	0.11	0.03	0.07
Vanadium	V											
Titanium	Ti											
Barium	Ba											
Calcium	Ca	0.03	0.05	0.04	0.04	0.03	0.03	0.04	0.05	0.06	0.03	0.04

[a]All blank spaces for other elements represent a value of 0.00

TABLE B-2. SUMMARY OF THE MALFUNCTION SCREENING
REPEAT FTP RESULTS mg/km (Except as Noted)

Test Number, PVM-ST	UNMODIFIED				12% MISFIRE W/O O_2		RICH[a]		
	42A1-1	42A1-2	42A1-31	42A1-32	42D2-1	42D2-2	42B2	42F2	42G2
Barometer, mm Hg	740.7	740.7	738.9	741.7	741.9	736.9	743.5	742.7	738.6
Humidity, g/kg	8.9	10.5	10.3	9.8	10.4	9.2	8.2	11.8	9.4
Temperature, °C	22.8	22.2	21.1	22.2	22.2	22.2	22.8	22.2	21.7
Total Fuel Sulfur, mg/km	24.97	24.97	23.02	23.62	30.59	29.52	26.64	28.86	29.36
Avg. Exh. Oxygen, %	--	--	--	--	--	--	--	--	--
Catalyst Avg. Temp., °C	416.	412.	404.	400.	494.	496.	338.	329.	342.
Catalyst Max. Temp., °C	525.	521.	517.	508.	627.	647.	431.	397.	414.
Carbon Dioxide, g/km	267.3	266.9	246.6	253.1	229.4	220.3	214.0	207.0	216.0
Fuel Cons., ℓ/100 km	11.65	11.65	10.74	11.02	14.27	13.77	12.43	13.47	13.70
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.25	0.24	0.23	0.24	8.13	7.88	1.40	2.02	1.54
Carbon Monoxide, g/km	3.15	3.37	2.76	2.77	50.40	49.23	46.35	64.95	63.65
Oxides of Nitrogen, g/km	0.37	0.38	0.40	0.43	0.11	0.11	0.15	0.29	0.25
Particulates									
Total Particulates	4.52	--	8.76	3.32	20.79	12.55	23.77	24.95	6.74
Sulfate	0.33	0.36	0.99	1.07	3.07	0.86	0.21	0.69	0.17
Sulfate as % of TFS, %	0.44	0.48	1.43	1.51	3.35	0.97	0.26	0.80	0.19
Compound Group Totals									
Aldehydes & Ketones	3.7	3.5	3.9	1.8	7.1	4.6	4.3	0.7	3.2
Individual Hydrocarbons	--	--	--	--	--	--	--	--	--
Organic Sulfides	0.06	0.18	0.08	0.09	2.47	2.27	0.70	0.36	0.23
Organic Amines	0.00	0.13	0.00	0.00	0.02	0.02	--	0.00	0.02
Other Compounds									
Ammonia	3.53	3.64	--	--	--	--	--	--	--
Cyanide & Cyanogen	1.83	1.97	--	--	--	--	10.15	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.11	0.15	0.72	0.02	6.68	8.77	0.62	0.49	0.47
Nickel Carbonyl	--	--	0.00	0.00	--		--	0.00	0.00
Nitrous Oxide									

[a] Similar but not identical malfunctions

TABLE B-2 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING
REPEAT FTP RESULTS mg/km (Except as Noted)

	UNMODIFIED				12% MISFIRE W/O O_2		RICH[a]		
Test Number, PVM-ST	42A1-1	42A1-2	42A1-31	42A1-32	42D2-1	42D2-2	42B2	42F2	42G2
Aldehydes and Ketones									
Formaldehyde	1.05	1.42	0.79	1.14	1.09	0.93	1.05	0.12	1.09
Acetaldehyde	0.62	1.35	1.48	0.17	3.79	2.70	2.90	0.00	1.36
Acetone	0.30	0.44	0.29	0.00	0.62	0.27	0.37	0.00	0.37
Isobutyraldehyde	0.00	0.00	0.00	0.09	0.00	0.48	0.00	0.00	0.00
Methyl Ethyl Ketone	1.50	0.15	1.22	0.19	1.57	0.10	0.00	0.06	0.16
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.23	0.17	0.11	0.17	0.06	0.08	0.00	0.48	0.18
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	3.7	3.5	3.9	1.8	7.1	4.6	4.3	0.7	3.2
Total as % of THC, %	1.5	1.5	1.7	0.8	0.1	0.1	0.3	0.0	0.2
Individual Hydrocarbons									
Methane	--	--	--	--	--	--	--	--	--
Ethylene	--	--	--	--	--	--	--	--	--
Ethane	--	--	--	--	--	--	--	--	--
Acetylene	--	--	--	--	--	--	--	--	--
Propane	--	--	--	--	--	--	--	--	--
Propylene	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--	--	--
Total Individual HC	--	--	--	--	--	--	--	--	--
Total as % of THC, %	--	--	--	--	--	--	--	--	--
Organic Sulfides									
Carbonyl Sulfide	0.04	0.18	0.07	0.03	2.47	2.27	0.70	0.33	0.19
Methyl Sulfide	0.02	<0.01	0.01	0.06	0.00	0.00	0.00	0.03	0.04
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<0.01
Methyl Disulfide	0.00	0.00	0.00	0.00	<0.01	<0.01	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.05	0.00	0.00	0.00	0.00	--	0.00	0.00
Monoethylamine	0.00	0.08	0.00	0.00	0.00	0.00	--	0.00	0.02
Trimethylamine	0.00	0.00	0.00	0.00	0.02	0.02	--	0.09	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	--	0.00	0.00

[a]Similar but not identical malfunctions

TABLE B-2 (Cont'd). SUMMARY OF THE MALFUNCTION SCREENING
REPEAT FTP RESULTS mg/km (Except as Noted)

Test Number, PVM-ST		Unmodified				12% Misfire w/o O_2		Rich[a]		
Trace Elements[b]		42A1-1	42A1-2	42A1-31	42A1-32	42D2-1	42D2-2	42B2	42F2	42G2
Chromium	Cr									
Lead	Pb			0.09	0.11		0.10	0.09		
Manganese	Mn	0.17	0.05	0.04	0.02	0.05	0.06	0.06	0.01	0.04
Arsenic	As									
Mercury	Hg									
Bromine	Br			0.03	0.04	0.02	0.05	0.05	0.03	
Phosphorus	P	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.01
Silicon	Si						0.01			0.00
Cadmium	Cd			0.01						
Aluminum	Al	0.02	0.01		0.01	0.02	0.02	0.02	0.01	0.01
Sulfur	S	0.04	0.03	0.04	0.02	0.07	0.08	0.02	0.04	0.02
Sodium	Na									
Fluorine	F									
Magnesium	Mg									
Potassium	K									
Chlorine	Cl	0.03	0.03	0.02	0.01	0.05	0.05	0.01	0.02	0.02
Platinum	Pt									
Zinc	Zn	0.07	0.01	0.02	0.02	0.03	0.03	0.01	0.02	0.01
Copper	Cu	0.02	0.04	0.02	0.02	0.02	0.04			
Nickel	Ni									
Iron	Fe	0.15	0.06	0.07	0.08	0.26	0.21	0.10	0.03	0.07
Vanadium	V									
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.05	0.04	0.03	0.04	0.04	0.06	0.04	0.03	0.04

[a] Similar but not identical malfunctions.

[b] All blank spaces for other elements represent a value of 0.00

TABLE B-3. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

	Emissions in mg/km			
	42A1-1 Unmodified		42A1-2 Unmodified	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	9.82	0.52	8.67	--
Sulfates	0.57	0.15	0.52	0.24
Ammonia	2.23	4.51	3.43	3.79
Cyanides & Cyanogen	3.04	0.92	3.43	0.87
Hydrogen Sulfide	0.25	0.00	0.34	0.00
Aldehydes & Ketones				
Formaldehyde	2.25	0.15	2.83	0.35
Acetaldehyde	0.94	0.38	1.72	1.07
Acetone	0.34	0.27	1.03	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.98	1.90	0.34	0.00
Crotonaldehyde	--	--	--	--
Hexanaldehyde	0.22	0.23	0.17	0.17
Benzaldehyde	--	--	--	--
Organic Sulfides				
Carbonyl sulfide	0.08	<0.01	0.26	0.11
Methyl sulfide	0.03	0.02	0.00	<0.01
Ethyl sulfide	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.07	0.03
Monoethylamine & dimethylamine	0.00	0.00	0.11	0.05
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

TABLE B-4. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

	Emissions in mg/km			
	42A1-31 Unmodified		42A1-32 Unmodified	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	11.78	6.48	5.13	1.95
Sulfates	1.88	0.32	1.35	0.85
Ammonia	--	--	--	--
Cyanides & Cyanogen	--	--	--	--
Hydrogen Sulfide	1.54	0.10	0.04	0.00
Aldehydes & Ketones				
Formaldehyde	1.39	0.33	2.34	0.23
Acetaldehyde	1.71	1.30	0.40	0.00
Acetone	0.31	0.27	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.22	0.00
Methyl ethyl ketone	1.34	1.13	0.20	0.19
Crotonaldehyde	--	--	--	--
Hexanaldehyde	0.17	0.07	0.25	0.11
Benzaldehyde	--	--	--	--
Organic Sulfides				
Carbonyl sulfide	0.16	0.00	0.07	0.00
Methyl sulfide	0.04	0.00	0.07	0.05
Ethyl sulfide	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

TABLE B-5. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

	Emissions in mg/km					
	42D1-1 12% Misfire		42D2-1 12% Misfire W/O O_2		42D2-2 12% Misfire W/O O_2	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulates	16.32	9.74	25.09	17.55	17.58	8.76
Sulfates	0.30	0.16	4.48	2.01	1.16	0.63
Ammonia	16.31	35.70	--	--	--	--
Cyanide & Cyanogen	15.94	5.64	--	--	--	--
Hydrogen Sulfide	1.07	1.27	4.79	8.10	8.33	9.10
Aldehydes & Ketones						
Formaldehyde	3.01	0.31	2.40	0.11	2.17	0.00
Acetaldehyde	2.60	2.38	7.16	1.24	3.01	2.47
Acetone	0.28	0.09	1.44	0.00	0.62	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.84
Methyl ethyl ketone	0.32	4.23	2.73	0.69	0.16	0.06
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.13	0.00	0.07	0.08
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	1.34	1.38	1.92	2.89	2.14	2.38
Methyl sulfide	0.01	0.03	0.00	0.00	0.00	0.00
Ethyl sulfide	0.04	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.01	0.01	0.00	<0.01	0.00
Organic Amines						
Monomethylamine	0.00	0.08	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.04	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.04	0.00	0.03	0.02
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-6. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

	Emissions in mg/km					
	42E1-1 Full Lean		42F2-1 Rich Best Idle W/O O_2		42G2-1 Maximum Rich	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	9.09	2.66	25.77	24.34	9.87	4.28
Sulfates	0.72	0.56	1.11	0.38	0.19	0.16
Ammonia	--	--	--	--	--	--
Cyanide & Cyanogen	--	--	--	--	--	--
Hydrogen Sulfide	--	0.00	0.78	0.27	0.74	0.27
Aldehydes & Ketones						
Formaldehyde	5.27	0.15	0.29	0.00	1.45	0.82
Acetaldehyde	2.32	0.00	0.00	0.00	2.07	0.82
Acetone	0.60	0.00	0.00	0.00	0.48	0.28
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.54	0.00	0.12	0.01	0.22	0.11
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.41	0.26	1.01	0.08	0.27	0.12
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.02	0.00	0.46	0.23	0.21	0.16
Methyl sulfide	0.05	0.08	0.04	0.02	0.05	0.04
Ethyl sulfide	0.00	0.00	0.00	0.00	0.01	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.04	0.00	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.03	0.00	0.00	0.00	0.05	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-7. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

	Emissions in mg/km					
	42B2-1 Disabled O_2 Sensor		42C1-1 Disabled EGR		42C2-1 Disabled EGR W/O O_2	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	25.92	22.15	10.76	3.65	18.50	17.46
Sulfates	0.24	0.18	0.75	0.34	0.64	0.25
Ammonia	--	11.10	29.53	9.62	119.59	155.32
Cyanide & Cyanogen	9.92	10.33	3.32	0.64	16.34	18.93
Hydrogen Sulfide	0.59	0.65	0.00	0.00	0.65	0.32
Aldehydes & Ketones						
Formaldehyde	1.57	0.65	2.38	0.99	1.98	0.99
Acetaldehyde	1.71	3.79	2.67	2.22	2.41	5.78
Acetone	0.00	0.65	0.71	0.55	0.35	1.73
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	2.32	2.80	0.00	2.53
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.02	0.15	0.60	0.62
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.79	0.64	0.13	0.09	0.75	0.27
Methyl sulfide	<0.01	0.00	0.05	<0.01	0.00	0.00
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	--	0.03	0.05	0.07	0.01	0.11
Monoethylamine & dimethylamine	--	0.11	0.03	0.02	0.01	0.09
Trimethylamine	--	0.00	0.00	0.00	0.00	0.00
Diethylamine	--	0.00	0.00	0.00	0.00	0.00
Triethylamine	--	0.00	0.00	0.00	0.00	0.00

TABLE B-8. TEST 42A1-1 EMISSIONS RESULTS

PVE - 924 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 92A1-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 LITER (ID) L-4
TRANSMISSION A4
GVW 1720 KG(3791 LBS)

VEHICLE NO. 92
DATE 8/17/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-999
ODOMETER 2906 KM(1995 MILES)

BAROMETER 290.66 MM HG(29.16 IN HG)
RELATIVE HUMIDITY 50 PCT

DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 8.9 GM/KG

NOx HUMIDITY CORRECTION FACTOR .99

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM, H2O(IN, H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP, DEG, C(DEG, F)	33.9 (111.0)	33.9 (110.0)	33.9 (110.0)	33.9 (110.0)
BLOWER REVOLUTIONS	40708	69589	40611	69639
CVS FLOW SCF, CU. METRES(SCF)	76.3 (2699.0)	130.5 (4609.2)	76.2 (2690.1)	130.6 (4612.6)
HC SAMPLE METER/RANGE/PPM	19.7/ 3/ 197	8.0/ 2/ 8	19.5/ 2/ 19	7.7/ 2/ 8
HC BCKGRD METER/RANGE/PPM	.9/ 3/ 9	7.3/ 2/ 7	6.7/ 2/ 7	6.7/ 2/ 7
CO SAMPLE METER/RANGE/PPM	32.9/ 3/ 761	31.9/13/ 28	53.3/12/ 118	28.0/13/ 25
CO BCKGRD METER/RANGE/PPM	.9/ 3/ 9	1.1/13/ 1	.9/13/ 1	.7/13/ 1
CO2 SAMPLE METER/RANGE/PCT	66.2/ 3/ 1.19	93.2/ 3/ .79	62.2/ 3/ 1.11	93.5/ 3/ .79
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .05	3.3/ 3/ .05	3.8/ 3/ .06	4.1/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	33.8/ 2/ 39	7.9/ 2/ 7	10.2/ 2/ 10	8.5/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.2/ 2/ 0	.1/ 2/ 0	.2/ 2/ 1
DILUTION FACTOR	10.51	18.08	11.97	18.09
HC CONCENTRATION PPM	139	1	8	1
CO CONCENTRATION PPM	723	26	113	29
CO2 CONCENTRATION PCT	1.19	.69	1.05	.67
NOX CONCENTRATION PPM	33.0	7.2	10.1	7.8
HC MASS GRAMS	6.11	.08	.37	.10
CO MASS GRAMS	69.22	9.01	10.08	3.66
CO2 MASS GRAMS	1592.9	1698.6	1969.2	1608.8
NOX MASS GRAMS	4.59	1.70	1.39	1.85
HC GRAMS/KM	1.07	.01	.06	.02
CO GRAMS/KM	11.22	.65	1.74	.60
CO2 GRAMS/KM	278.3	269.1	255.7	262.9
NOX GRAMS/KM	.79	.28	.29	.30
FUEL CONSUMPTION BY CB L/100KM	12.77	11.53	11.04	11.29
RUN TIME SECONDS	505	866	505	866
AVG. EXH. OXYGEN PERCENT	3.18	3.81	3.05	3.79
CATALYST AVG. TEMP. DEG. C	206	471	412	499
CATALYST MAX. TEMP. DEG. C	457	517	525	542
MEASURED DISTANCE KM	5.72	6.13	5.75	6.13
DFC, WET (DRY)	.930 (.921)		.949 (.925)	
SCF, WET (DRY)	1.000 (.982)		1.000 (.982)	
VOL (SCM)	206.8		206.8	
KM (MEASURED)	11.85		11.88	

COMPOSITE RESULTS

TEST NUMBER		92A1-1				3-BAG	(4-BAG)
BAROMETER	MM HG	290.7	TOTAL FUEL SULFUR MG/KM	24.97	CARBON DIOXIDE G/KM	267.3	(265.3)
HUMIDITY	G/KG	8.9	AVG. EXH. OXYGEN PCT		FUEL CONSUMPTION L/100KM	11.65	(11.57)
TEMPERATURE	DEG C	22.8	CATALYST AVG. TEMP. DEG C	416	HYDROCARBONS (THC) G/KM	.05	(.25)
			CATALYST MAX. TEMP. DEG C	525	CARBON MONOXIDE G/KM	3.15	(3.13)
					OXIDES OF NITROGEN G/KM	.32	(.38)

TABLE B-9. TEST 42A1-2 EMISSIONS RESULTS

PVM - 42A FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 42A1-2 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/18/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KGF 3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 2929 KM(1809 MILES)

BAROMETER 740.66 MM HG(29.16 IN HG)
RELATIVE HUMIDITY 61 PCT
BAG RESULTS

DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 10.5 GM/KG

NOX HUMIDITY CORRECTION FACTOR .99

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	90708	69783	90605	67662
CVS FLOW STD. CU. METRES(SCF)	76.3 (2696.7)	130.9 (9622.9)	76.2 (2689.7)	130.6 (9619.9)
HC SAMPLE METER/RANGE/PPM	13.7/ 3/ 137	12.0/ 2/ 12	21.2/ 2/ 21	9.9/ 2/ 10
HC BCKGND METER/RANGE/PPM	1.2/ 3/ 12	10.7/ 2/ 11	9.1/ 2/ 9	8.9/ 2/ 9
CO SAMPLE METER/RANGE/PPM	39.2/ 3/ 806	35.3/13/ 31	70.9/12/ 161	29.0/13/ 23
CO BCKGND METER/RANGE/PPM	.6/ 3/ 19	9.6/13/ 9	2.3/12/ 9	3.1/13/ 3
CO2 SAMPLE METER/RANGE/PCT	66.9/ 3/ 1.19	93.2/ 3/ .79	62.9/ 3/ 1.12	93.6/ 3/ .75
CO2 BCKGND METER/RANGE/PCT	9.5/ 3/ .07	3.5/ 3/ .05	9.5/ 3/ .07	9.6/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	39.9/ 2/ 36	7.9/ 2/ 7	10.2/ 2/ 10	8.2/ 2/ 8
NOX BCKGND METER/RANGE/PPM	1.9/ 2/ 1	.9/ 2/ 1	.7/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	10.95	18.06	11.77	17.91
HC CONCENTRATION PPM	126	2	13	1
CO CONCENTRATION PPM	760	22	150	19
CO2 CONCENTRATION PCT	1.13	.69	1.06	.68
NOX CONCENTRATION PPM	33.6	6.5	9.6	7.5
HC MASS GRAMS	5.56	.19	.57	.10
CO MASS GRAMS	67.53	3.31	13.39	2.92
CO2 MASS GRAMS	1578.1	1696.3	1979.8	1623.0
NOX MASS GRAMS	9.87	1.63	1.38	1.87
HC GRAMS/KM	.96	.02	.10	.02
CO GRAMS/KM	11.71	.59	2.31	.98
CO2 GRAMS/KM	273.6	270.2	255.9	266.5
NOX GRAMS/KM	.89	.27	.29	.31
FUEL CONSUMPTION BY CB L/100KM	12.59	11.57	11.09	11.91
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	3.26	3.96	3.19	3.66
CATALYST AVG. TEMP. DEG. C	209	472	382	489
CATALYST MAX. TEMP. DEG. C	466	521	517	537
MEASURED DISTANCE KM	5.77	6.09	5.76	6.09
DFC, WET (DRY)	.930 (.917)		.933 (.921)	
SLF, WET (DRY)	1.000 (.978)		1.000 (.979)	
VOL (SCM)	207.2		206.8	
KM (MEASURED)	11.86		11.85	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	42A1-2	TOTAL FUEL SULFUR	MG/KM 24.97	CARBON DIOXIDE	G/KM	266.9	(265.9)
BAROMETER MM HG	740.7	AVG. EXH. OXYGEN	PCT	FUEL CONSUMPTION	L/100KM	11.65	(11.60)
HUMIDITY G/KG	10.5	CATALYST AVG. TEMP. DEG C	412	HYDROCARBONS (THC)	G/KM	.29	(.29)
TEMPERATURE DEG C	22.2	CATALYST MAX. TEMP. DEG C	521	CARBON MONOXIDE	G/KM	3.37	(3.35)
				OXIDES OF NITROGEN	G/KM	.38	(.39)

TABLE B-10. TEST 42A1-3 EMISSIONS RESULTS

PVM - 42A FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 42A1-3 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/29/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 2633 KM(1636 MILES)

BAROMETER 738.89 MM HG(29.09 IN HG)
RELATIVE HUMIDITY 69 PCT

DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
ABS. HUMIDITY 10.3 GM/KG

NOX HUMIDITY CORRECTION FACTOR .99

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.9 (111.0)	33.3 (110.0)	32.2 (108.0)	33.3 (110.0)
BLOWER REVOLUTIONS	90807	69629	90299	69690
CVS FLOW STD. CU. METRES(SCF)	76.3 (2693.2)	130.3 (4602.8)	76.4 (2697.4)	130.3 (4603.6)
HC SAMPLE METER/RANGE/PPM	13.5/ 3/ 135	9.3/ 2/ 9	13.9/ 2/ 14	9.2/ 2/ 9
HC ACKGRD METER/RANGE/PPM	1.0/ 3/ 10	0.9/ 2/ 0	7.9/ 2/ 7	7.5/ 2/ 8
CO SAMPLE METER/RANGE/PPM	31.5/ 3/ 738	27.1/13/ 25	29.2/13/ 58	32.3/13/ 29
CO ACKGRD METER/RANGE/PPM	.5/ 3/ 11	2.0/13/ 2	9.1/13/ 9	15.9/13/ 15
CO2 SAMPLE METER/RANGE/PCT	62.6/ 3/ 1.11	90.8/ 3/ .69	55.3/ 3/ .97	92.9/ 3/ .72
CO2 ACKGRD METER/RANGE/PCT	3.3/ 3/ .05	3.9/ 3/ .05	3.3/ 3/ .05	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	33.9/ 2/ 34	7.9/ 2/ 8	11.2/ 2/ 11	8.5/ 2/ 9
NOX ACKGRD METER/RANGE/PPM	.9/ 2/ 0	.6/ 2/ 1	.7/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	11.18	18.25	13.71	18.95
HC CONCENTRATION PPM	126	1	7	2
CO CONCENTRATION PPM	692	22	53	19
CO2 CONCENTRATION PCT	1.07	.69	.92	.67
NOX CONCENTRATION PPM	33.5	7.8	10.6	7.6
HC MASS GRAMS	5.59	.10	.31	.16
CO MASS GRAMS	61.92	3.35	9.67	2.20
CO2 MASS GRAMS	1992.7	1535.1	1291.9	1593.1
NOX MASS GRAMS	9.82	1.80	1.52	1.86
HC GRAMS/KM	.97	.02	.05	.03
CO GRAMS/KM	10.85	.55	.82	.36
CO2 GRAMS/KM	261.7	251.3	226.5	260.5
NOX GRAMS/KM	.85	.29	.27	.30
FUEL CONSUMPTION BY CA L/100KM	12.03	10.76	9.73	11.15
RUN TIME SECONDS	506	867	505	868
AVG. EXH. OXYGEN PERCENT	3.00	3.69	3.11	3.67
CATALYST AVG. TEMP. DEG. C	193	456	907	903
CATALYST MAX. TEMP. DEG. C	999	509	517	533
MEASURED DISTANCE KM	5.70	6.11	5.70	6.12
DFC, WET (DRY)	.939 (.921)		.939 (.926)	
SCF, WET (DRY)	1.000 (.978)		1.000 (.978)	
VOL (SCM)	206.6		206.7	
KM (MEASURED)	11.81		11.82	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	42A1-3	TOTAL FUEL SULFUR	MG/KM 23.02	CARBON DIOXIDE	G/KM	296.6	(299.3)
BAROMETER MM HG	738.9	AVG. EXH. OXYGEN	PCT	FUEL CONSUMPTION	L/100KM	10.76	(10.85)
HUMIDITY G/KG	10.3	CATALYST AVG. TEMP. DEG C	909	HYDROCARBONS (THC)	G/KM	.23	(.23)
TEMPERATURE DEG C	21.1	CATALYST MAX. TEMP. DEG C	517	CARBON MONOXIDE	G/KM	2.76	(2.71)
				OXIDES OF NITROGEN	G/KM	.90	(.90)

TABLE B-11. TESTS 42A1-4 EMISSIONS RESULTS

PVM - 42A FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 9241-3 RUN 2
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/30/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 2802 KM(1741 MILES)

BAROMETER 741.68 MM HG(29.20 IN HG)
RELATIVE HUMIDITY 57 PCT
BAG RESULTS

DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 9.8 GM/KG

NOX HUMIDITY CORRECTION FACTOR .97

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H20(IN. H20)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H20(IN. H20)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	50292	69455	50619	69615
CVS FLOW STD. CU. METRES(SCF)	76.7 (2709.1)	130.8 (9620.9)	76.3 (2699.3)	130.7 (9617.6)
HC SAMPLE METER/RANGE/PPM	13.7/ 3/ 137	8.9/ 2/ 9	16.8/ 2/ 17	9.0/ 2/ 9
HC BCKGRD METER/RANGE/PPM	.9/ 3/ 9	7.6/ 2/ 8	7.6/ 2/ 8	7.6/ 2/ 8
CO SAMPLE METER/RANGE/PPM	28.8/ 3/ 672	21.2/13/ 20	50.3/12/ 111	21.3/13/ 20
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	1.1/13/ 1	1.5/13/ 1	3.1/13/ 3
CO2 SAMPLE METER/RANGE/PCT	62.2/ 3/ 1.11	90.1/ 3/ .69	57.7/ 3/ 1.02	91.1/ 3/ .70
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	2.0/ 3/ .03	2.7/ 3/ .09	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	37.6/ 2/ 38	8.3/ 2/ 8	11.2/ 2/ 11	8.5/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.1/ 2/ 0	.5/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	11.31	19.98	13.01	18.96
HC CONCENTRATION PPM	129	2	10	2
CO CONCENTRATION PPM	693	18	105	14
CO2 CONCENTRATION PCT	1.06	.46	.98	.65
NOX CONCENTRATION PPM	36.8	8.2	10.7	7.9
HC MASS GRAMS	5.78	.13	.93	.19
CO MASS GRAMS	57.93	2.75	9.36	2.95
CO2 MASS GRAMS	1693.9	1572.1	1368.0	1599.9
NOX MASS GRAMS	5.23	1.99	1.52	1.92
HC GRAMS/KM	1.00	.02	.08	.02
CO GRAMS/KM	10.05	.35	1.64	.40
CO2 GRAMS/KM	261.5	256.8	239.7	253.7
NOX GRAMS/KM	.92	.33	.27	.31
FUEL CONSUMPTION BY CR L/100KM	11.97	10.99	10.36	10.86
RUN TIME SECONDS	506	868	505	868
AVG. EXH. OXYGEN PERCENT	9.69	5.82	9.50	5.71
CATALYST AVG. TEMP. DEG. C	196	454	389	477
CATALYST MAX. TEMP. DEG. C	999	999	508	525
MEASURED DISTANCE KM	5.71	6.12	5.71	6.11
DFC, WET (DRY)	.935 (.929)		.938 (.927)	
SCF, WET (DRY)	1.000 (.980)		1.000 (.980)	
VOL (SCM)	207.5		207.0	
KM (MEASURED)	11.89		11.81	

COMPOSITE RESULTS

								3-BAG	(4-BAG)
TEST NUMBER	9241-3	TOTAL FUEL SULFUR	MG/KM	23.62	CARBON DIOXIDE	G/KM		253.1	(252.2)
BAROMETER	MM HG 741.7	AVG. EXH. OXYGEN	PCT		FUEL CONSUMPTION	L/100KM		11.02	(10.98)
HUMIDITY	G/KG 9.8	CATALYST AVG. TEMP.	DEG C	400	HYDROCARBONS (THC)	G/KM		.29	(.29)
TEMPERATURE	DEG C 22.9	CATALYST MAX. TEMP.	DEG C	508	CARBON MONOXIDE	G/KM		2.77	(2.76)
					OXIDES OF NITROGEN	G/KM		.93	(.93)

TABLE B-12. TESTS 42B2-1 EMISSIONS RESULTS

PVM - 42B FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4489-001

TEST NO. 42B2-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/21/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-389
ODOMETER 2466 KM(1532 MILES)

BAROMETER 743.96 MM HG(29.27 IN HG)
RELATIVE HUMIDITY 46 PCT
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 8.2 GM/KG
NOX HUMIDITY CORRECTION FACTOR .92

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	249.3 (29.5)	249.3 (29.5)	249.3 (29.5)	249.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	249.3 (29.5)	249.3 (29.5)	249.3 (29.5)	249.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40819	64222	40592	64563
CVS FLOW STD. CU. METRES(SCF)	77.1 (2722.6)	130.9 (4607.5)	76.9 (2699.8)	131.0 (4626.5)
HC SAMPLE METER/RANGE/PPM	26.2/ 3/ 262	11.9/ 3/ 119	16.9/ 3/ 169	11.8/ 3/ 118
HC BCKGRD METER/RANGE/PPM	1.4/ 3/ 14	1.9/ 3/ 19	1.5/ 3/ 15	1.3/ 3/ 13
CO SAMPLE METER/RANGE/PPM	71.2/ 2/ 3882	39.1/ 2/ 1761	59.8/ 2/ 3036	36.3/ 2/ 1611
CO BCKGRD METER/RANGE/PPM	.2/ 2/ 8	.3/ 2/ 11	.4/ 2/ 15	.4/ 2/ 15
CO2 SAMPLE METER/RANGE/PCT	55.2/ 3/ .97	37.6/ 3/ .63	51.0/ 3/ .89	37.7/ 3/ .64
CO2 BCKGRD METER/RANGE/PCT	4.4/ 3/ .08	4.8/ 3/ .07	4.4/ 3/ .08	4.4/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	20.4/ 2/ 20	1.6/ 2/ 2	3.7/ 2/ 4	1.6/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ 0	.3/ 2/ 0	.2/ 2/ 0	.1/ 2/ 0
DILUTION FACTOR	9.78	14.91	11.14	14.47
HC CONCENTRATION PPM	249	106	155	106
CO CONCENTRATION PPM	3749	1703	2925	1553
CO2 CONCENTRATION PCT	.90	.56	.82	.56
NOX CONCENTRATION PPM	20.0	1.3	3.5	1.5
HC MASS GRAMS	11.09	7.96	6.85	7.99
CO MASS GRAMS	336.12	258.65	260.33	236.84
CO2 MASS GRAMS	12711.2	1397.3	1144.7	1353.6
NOX MASS GRAMS	2.73	.30	.97	.35
HC GRAMS/KM	1.92	1.30	1.14	1.30
CO GRAMS/KM	58.11	42.25	45.09	38.56
CO2 GRAMS/KM	219.8	220.1	198.3	220.4
NOX GRAMS/KM	.47	.05	.08	.06
FUEL CONSUMPTION BY CB L/100KM	13.54	12.90	11.65	12.17
RUN TIME SECONDS	505	866	505	867
AVG. EXH. OXYGEN PERCENT	3.39	4.47	3.99	4.32
CATALYST AVG. TEMP. DEG. C	182	386	311	403
CATALYST MAX. TEMP. DEG. C	389	431	418	444
MEASURED DISTANCE KM	5.78	6.12	5.77	6.14
DFC. WET (DRY)	.929 (.916)		.929 (.921)	
SCF. WET (DRY)	1.000 (.984)		1.000 (.985)	
VOL (SCM)	207.5		207.9	
KM (MEASURED)	11.91		11.92	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	42B2-1	TOTAL FUEL SULFUR	MG/KM	26.64	CARBON DIOXIDE	G/KM	219.0	(219.1)
BAROMETER	MM HG 743.5	AVG. EXH. OXYGEN	PCT	4.08	FUEL CONSUMPTION	L/100KM	12.93	(12.36)
HUMIDITY	G/KG 8.2	CATALYST AVG. TEMP.	DEG C	338	HYDROCARBONS (THC)	G/KM	1.40	(1.40)
TEMPERATURE	DEG C 22.8	CATALYST MAX. TEMP.	DEG C	431	CARBON MONOXIDE	G/KM	46.35	(45.27)
					OXIDES OF NITROGEN	G/KM	.15	(.15)

TABLE B-13. TESTS 42C1-1 EMISSIONS RESULTS

PVM - 42C FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR
PROJECT 11-9999-001

TEST NO. 42C1-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/22/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-393
ODOMETER 2488 KM(1546 MILES)

BAROMETER 743.20 MM HG(29.26 IN HG)
RELATIVE HUMIDITY 65 PCT
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 11.6 GM/KG
NOX HUMIDITY CORRECTION FACTOR 1.03

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	40679	69900	40780	69560
CVS FLOW STD. CU. METRES(SCF)	76.6 (2704.8)	130.6 (4613.2)	76.8 (2711.5)	130.9 (4629.8)
HC SAMPLE METER/RANGE/PPM	10.0/ 3/ 100	14.0/ 2/ 14	22.1/ 2/ 22	12.5/ 2/ 13
HC BCKGRD METER/RANGE/PPM	1.5/ 3/ 15	12.9/ 2/ 13	11.2/ 2/ 11	11.1/ 2/ 11
CO SAMPLE METER/RANGE/PPM	29.9/ 3/ 577	28.2/13/ 26	99.7/13/ 65	29.1/13/ 22
CO BCKGRD METER/RANGE/PPM	.7/ 3/ 16	9.5/13/ 9	6.9/13/ 6	9.0/13/ 9
CO2 SAMPLE METER/RANGE/PCT	69.1/ 3/ 1.19	92.0/ 3/ .72	60.0/ 3/ 1.06	92.3/ 3/ .72
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .06	3.0/ 3/ .06	3.9/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	39.7/ 2/ 99	16.0/ 2/ 16	31.5/ 2/ 31	16.2/ 2/ 16
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	.6/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	11.07	18.69	12.51	18.51
HC CONCENTRATION PPM	86	2	12	2
CO CONCENTRATION PPM	538	16	57	18
CO2 CONCENTRATION PCT	1.09	.66	1.01	.66
NOX CONCENTRATION PPM	39.1	15.9	31.0	15.7
HC MASS GRAMS	3.81	.19	.52	.15
CO MASS GRAMS	47.97	2.98	5.11	2.71
CO2 MASS GRAMS	1525.3	1571.9	1917.0	1592.9
NOX MASS GRAMS	5.89	3.97	4.69	4.05
HC GRAMS/KM	.46	.02	.09	.02
CO GRAMS/KM	8.36	.90	.89	.99
CO2 GRAMS/KM	265.9	256.3	296.2	260.8
NOX GRAMS/KM	1.03	.65	.82	.66
FUEL CONSUMPTION BY CB L/100KM	12.00	10.97	10.58	11.17
RUN TIME SECONDS	505	867	507	865
AVG. EXH. OXYGEN PERCENT	3.75	9.58	3.66	9.47
CATALYST AVG. TEMP. DEG. C	199	956	393	982
CATALYST MAX. TEMP. DEG. C	951	999	509	525
MEASURED DISTANCE KM	5.79	6.13	5.75	6.11
DFC, WET (DRY)	.933 (.919)		.936 (.923)	
SCF, WET (DRY)	1.000 (.977)		1.000 (.978)	
VOL (SCM)	207.2		207.7	
KM (MEASURED)	11.87		11.86	

COMPOSITE RESULTS

							3-BAG	(4-BAG)
TEST NUMBER	42C1-1	TOTAL FUEL SULFUR	MG/KM	23.79	CARBON DIOXIDE	G/KM	255.5	(256.8)
BAROMETER MM HG	743.2	AVG. EXH. OXYGEN	PCT		FUEL CONSUMPTION	L/100KM	11.08	(11.13)
HUMIDITY G/KG	11.6	CATALYST AVG. TEMP.	DEG C	402	HYDROCARBONS (THC)	G/KM	.17	(.18)
TEMPERATURE DEG C	22.8	CATALYST MAX. TEMP.	DEG C	509	CARBON MONOXIDE	G/KM	2.19	(2.20)
					OXIDES OF NITROGEN	G/KM	.72	(.78)

TABLE B-14. TESTS 42C2-1 EMISSIONS RESULTS

PVM - 82C FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR W/O O
PROJECT 11-8489-001

TEST NO. 82C2-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 82
DATE 8/23/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-3488
ODOMETER 2514 KM(1562 MILES)

BAROMETER 748.14 MM HG(29.22 IN HG)
RELATIVE HUMIDITY 58 PCT
DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
ABS. HUMIDITY 8.3 GM/KG

NOX HUMIDITY CORRECTION FACTOR .93

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG, F)	23.3 (110.0)	32.8 (109.0)	23.3 (110.0)	23.3 (110.0)
BLOWER REVOLUTIONS	40691	64599	40813	64939
CVS FLOW STD. CU. METRES(SCF)	76.9 (2696.9)	130.7 (4616.5)	76.6 (2709.8)	130.3 (4600.9)
HC SAMPLE METER/RANGE/PPM	31.3/ 3/ 313	12.5/ 3/ 125	19.5/ 3/ 195	13.2/ 3/ 132
HC BCKGRD METER/RANGE/PPM	1.2/ 3/ 12	1.3/ 3/ 13	.4/ 3/ 4	1.2/ 3/ 12
CO SAMPLE METER/RANGE/PPM	79.9/ 2/ 9607	99.6/ 2/ 2071	71.9/ 2/ 3937	96.7/ 2/ 2199
CO BCKGRD METER/RANGE/PPM	.3/ 2/ 11	.3/ 2/ 11	.3/ 2/ 11	.5/ 2/ 19
CO2 SAMPLE METER/RANGE/PCT	51.3/ 3/ .89	33.2/ 3/ .55	28.6/ 3/ .89	34.2/ 3/ .61
CO2 BCKGRD METER/RANGE/PCT	9.1/ 3/ .06	9.2/ 3/ .06	9.3/ 3/ .07	9.8/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	19.0/ 2/ 19	2.1/ 2/ 2	6.8/ 2/ 7	2.5/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	4.79	17.47	10.80	16.07
HC CONCENTRATION PPM	302	113	187	181
CO CONCENTRATION PPM	9940	2003	3798	2119
CO2 CONCENTRATION PCT	.89	.99	.78	.59
NOX CONCENTRATION PPM	18.3	1.6	6.3	2.0
HC MASS GRAMS	13.31	8.50	8.25	9.07
CO MASS GRAMS	399.82	309.90	338.66	320.67
CO2 MASS GRAMS	1168.6	1178.3	1099.3	1289.3
NOX MASS GRAMS	2.97	.38	.86	.97
HC GRAMS/KM	2.32	1.90	1.99	1.99
CO GRAMS/KM	68.91	50.08	58.99	52.58
CO2 GRAMS/KM	204.0	193.5	190.5	210.6
NOX GRAMS/KM	.93	.06	.15	.08
FUEL CONSUMPTION AV CS L/100KM	13.69	11.81	12.28	12.72
RUN TIME SECONDS	509	866	506	865
AVG. EXH. OXYGEN PERCENT	3.56	4.89	3.91	4.79
CATALYST AVG. TEMP. DEG. C	160	329	321	395
CATALYST MAX. TEMP. DEG. C	372	414	423	440
MEASURED DISTANCE KM	5.93	6.09	5.75	6.10
DFC, WET (DRY)	.926 (.917)		.927 (.917)	
SCF, WET (DRY)	1.000 (.983)		1.000 (.983)	
VOL (SCM)	207.1		206.8	
KM (MEASURED)	11.82		11.84	

COMPOSITE RESULTS

TEST NUMBER		82CP-1
BAROMETER	MM HG	748.2
HUMIDITY	G/KG	8.3
TEMPERATURE	DEG C	21.1

TOTAL FUEL SULFUR	MG/KM	26.40
AVG. EXH. OXYGEN	PCT	4.47
CATALYST AVG. TEMP.	DEG C	329
CATALYST MAX. TEMP.	DEG C	423

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	199.9	(199.9)
FUEL CONSUMPTION	L/100KM	12.32	(12.59)
HYDROCARBONS (THC)	G/KM	1.60	(1.63)
CARBON MONOXIDE	G/KM	56.96	(57.19)
OXIDES OF NITROGEN	G/KM	.16	(.17)

TABLE B-15. TESTS 42D1-1 EMISSIONS RESULTS

PVM - 420 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-9989-001

TEST NO. 42D1-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/24/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 2593 KM(1580 MILES)

BAROMETER 743.71 MM HG(29.28 IN HG)
RELATIVE HUMIDITY 55 PCT
DRY BULB TEMP. 20.6 DEG C(69.0 DEG F)
ABS. HUMIDITY 8.5 GM/KG

NOX HUMIDITY CORRECTION FACTOR .93

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	90600	69577	90715	69730
CVS FLOW STD. CU. METRES(SCF)	76.3 (2696.5)	130.8 (4620.7)	76.6 (2709.4)	131.1 (4631.2)
HC SAMPLE METER/RANGE/PPM	66.4/ 3/ 669	76.6/ 2/ 77	15.0/ 3/ 150	63.4/ 2/ 63
HC BCKGRD METER/RANGE/PPM	1.4/ 3/ 14	1.4/ 3/ 14	1.1/ 3/ 11	9.0/ 2/ 9
CO SAMPLE METER/RANGE/PPM	99.8/ 3/ 1001	95.8/12/ 238	19.4/ 3/ 196	99.9/12/ 253
CO BCKGRD METER/RANGE/PPM	.4/ 3/ 4	2.8/12/ 5	.1/ 3/ 2	2.3/12/ 9
CO2 SAMPLE METER/RANGE/PCT	63.0/ 3/ 1.12	92.3/ 3/ .72	60.1/ 3/ 1.06	99.4/ 3/ .76
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	4.5/ 3/ .07	3.4/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	31.8/ 2/ 32	3.4/ 2/ 4	3.4/ 2/ 4	3.2/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.6/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	10.36	17.84	11.43	16.99
HC CONCENTRATION PPM	656	63	190	55
CO CONCENTRATION PPM	1031	225	927	291
CO2 CONCENTRATION PCT	1.07	.66	1.01	.71
NOx CONCENTRATION PPM	31.1	3.3	3.9	2.7
HC MASS GRAMS	28.90	9.78	6.18	9.15
CO MASS GRAMS	91.62	39.35	38.09	36.80
CO2 MASS GRAMS	1502.1	1570.2	1416.9	1697.3
NOX MASS GRAMS	9.23	.78	.97	.69
HC GRAMS/KM	5.08	.78	1.09	.68
CO GRAMS/KM	16.10	5.69	6.68	6.05
CO2 GRAMS/KM	264.0	257.7	248.8	279.0
NOX GRAMS/KM	.79	.13	.08	.10
FUEL CONSUMPTION BY C8 L/100KM	13.09	11.98	11.21	12.90
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	3.60	3.63	3.06	3.93
CATALYST AVG. TEMP. DEG. C	259	587	593	607
CATALYST MAX. TEMP. DEG. C	572	652	661	679
MEASURED DISTANCE KM	5.69	6.09	5.69	6.08
DFC, WET (DRY)	.929 (.918)		.932 (.921)	
SCF, WET (DRY)	1.000 (.981)		1.000 (.981)	
VOL (SCM)	207.2		207.7	
KM (MEASURED)	11.78		11.78	

COMPOSITE RESULTS

TEST NUMBER		42D1-1
BAROMETER	MM HG	743.7
HUMIDITY	G/KG	8.5
TEMPERATURE	DEG C	20.6

TOTAL FUEL SULFUR	MG/KM	25.19
AVG. EXH. OXYGEN	PCT	
CATALYST AVG. TEMP.	DEG C	525
CATALYST MAX. TEMP.	DEG C	661

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	256.5	(262.8)
FUEL CONSUMPTION	L/100KM	11.73	(12.00)
HYDROCARBONS (THC)	G/KM	1.76	(1.73)
CARBON MONOXIDE	G/KM	8.10	(8.22)
OXIDES OF NITROGEN	G/KM	.29	(.29)

TABLE B-16. TESTS 42D2-1 EMISSIONS RESULTS

PVM - 42D FTP VEHICLE EMISSIONS RESULTS - 12 PCT MISFIRE W/O O
PROJECT 11-9989-001

TEST NO. 42D2-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/25/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-369
ODOMETER 2565 KM(1594 MILES)

BAROMETER 741.99 MM HG(29.21 IN HG)
RELATIVE HUMIDITY 61 PCT
DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 10.4 GM/KG

NOX HUMIDITY CORRECTION FACTOR .99

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	779.7 (30.6)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	80778	70216	80769	69825
CVS FLOW STD. CU. METRES(SCF)	76.5 (2701.2)	131.7 (9650.7)	76.5 (2701.1)	131.0 (9625.7)
HC SAMPLE METER/RANGE/PPM	19.2/ 6/ 1980	61.8/ 3/ 618	97.6/ 3/ 976	58.1/ 3/ 581
HC BCKGRD METER/RANGE/PPM	.9/ 6/ 90	1.7/ 3/ 17	1.7/ 3/ 17	2.1/ 3/ 21
CO SAMPLE METER/RANGE/PPM	75.9/ 2/ 9269	92.2/ 2/ 1439	62.0/ 2/ 3190	91.3/ 2/ 1883
CO BCKGRD METER/RANGE/PPM	.9/ 2/ 15	.5/ 2/ 19	.6/ 2/ 23	.8/ 2/ 30
CO2 SAMPLE METER/RANGE/PCT	56.8/ 3/ 1.00	39.0/ 3/ .66	52.1/ 3/ .91	38.9/ 3/ .65
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.8/ 3/ .06	3.8/ 3/ .06	4.5/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	14.7/ 2/ 17	.9/ 2/ 1	1.6/ 2/ 2	1.3/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.3/ 2/ 0	.6/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	8.69	14.75	10.21	15.08
HC CONCENTRATION PPM	1385	602	961	561
CO CONCENTRATION PPM	9085	1859	3052	1799
CO2 CONCENTRATION PCT	.95	.60	.86	.58
NOX CONCENTRATION PPM	16.2	.6	1.1	.6
HC MASS GRAMS	61.08	95.73	92.37	92.91
CO MASS GRAMS	363.86	285.00	271.76	273.69
CO2 MASS GRAMS	1333.7	1958.5	1147.7	1399.5
NOX MASS GRAMS	2.34	.15	.15	.19
HC GRAMS/KM	10.66	7.98	7.93	6.93
CO GRAMS/KM	63.98	46.59	47.67	44.69
CO2 GRAMS/KM	232.7	238.9	210.1	228.5
NOX GRAMS/KM	.91	.03	.03	.02
FUEL CONSUMPTION BY CB L/100KM	15.63	19.31	13.17	13.69
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	3.62	3.63	3.86	3.58
CATALYST AVG. TEMP. DEG. C	833	559	999	583
CATALYST MAX. TEMP. DEG. C	938	619	627	631
MEASURED DISTANCE KM	5.73	6.12	5.70	6.12
DFC. WET (DRY)	.915 (.902)		.922 (.910)	
SCF. WET (DRY)	1.000 (.980)		1.000 (.980)	
VOL (SCM)	208.2		207.9	
KM (MEASURED)	11.85		11.82	

COMPOSITE RESULTS

TEST NUMBER		42D2-1
BAROMETER	MM HG	741.9
HUMIDITY	G/KG	10.4
TEMPERATURE	DEG C	22.2

TOTAL FUEL SULFUR	MG/KM	30.59
AVG. EXH. OXYGEN	PCT	3.51
CATALYST AVG. TEMP.	DEG C	699
CATALYST MAX. TEMP.	DEG C	627

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	229.9	(226.5)
FUEL CONSUMPTION	L/100KM	14.27	(14.09)
HYDROCARBONS (THC)	G/KM	8.13	(7.96)
CARBON MONOXIDE	G/KM	50.90	(49.84)
OXIDES OF NITROGEN	G/KM	.11	(.10)

TABLE B-17. TEST 42D2-2 EMISSIONS RESULTS

PVM - 420 FTP VEHICLE EMISSIONS RESULTS - 12 PCT MISFIRE W/O O
PROJECT 11-79B9-001

TEST NO. 42D2-2 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 8/28/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-3399
ODOMETER 2606 KM(1619 MILES)

BAROMETER 736.86 MM HG(29.01 IN HG)
RELATIVE HUMIDITY 53 PCT
DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 9.2 GM/KG

NOX HUMIDITY CORRECTION FACTOR .95

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H2O(IN, H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM, H2O(IN, H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP, DEG, C(DEG, F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40800	64748	40461	64677
CVS FLOW STD. CU. METRES(SCF)	76.1 (2687.7)	130.1 (4593.9)	75.8 (2678.2)	129.9 (4589.0)
HC SAMPLE METER/RANGE/PPM	14.3/ 6/ 1930	61.7/ 3/ 617	89.6/ 3/ 899	57.9/ 3/ 579
HC BCKGRD METER/RANGE/PPM	.3/ 6/ 30	1.5/ 3/ 15	1.6/ 3/ 16	1.5/ 3/ 15
CO SAMPLE METER/RANGE/PPM	75.3/ 2/ 9219	98.7/ 2/ 1961	59.8/ 2/ 3036	92.8/ 2/ 1967
CO BCKGRD METER/RANGE/PPM	.6/ 2/ 23	.6/ 2/ 23	1.0/ 2/ 38	.9/ 2/ 36
CO2 SAMPLE METER/RANGE/PCT	55.6/ 3/ .98	36.2/ 3/ .61	52.9/ 3/ .92	38.2/ 3/ .69
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .09	2.5/ 3/ .06	5.6/ 3/ .05	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	14.9/ 2/ 19	.9/ 2/ 1	1.6/ 2/ 2	.9/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.9/ 2/ 0	.9/ 2/ 0	.9/ 2/ 0
DILUTION FACTOR	8.78	15.58	10.26	15.01
HC CONCENTRATION PPM	1903	603	881	560
CO CONCENTRATION PPM	9043	1889	2896	1878
CO2 CONCENTRATION PCT	.99	.57	.88	.59
NOX CONCENTRATION PPM	18.7	.9	1.2	.5
HC MASS GRAMS	61.68	99.23	38.55	91.97
CO MASS GRAMS	358.27	285.33	255.78	289.87
CO2 MASS GRAMS	1309.3	1362.2	1216.9	1903.8
NOX MASS GRAMS	2.59	.12	.17	.12
HC GRAMS/KM	10.88	7.31	6.77	6.80
CO GRAMS/KM	62.83	46.12	44.89	46.02
CO2 GRAMS/KM	229.6	220.2	213.6	227.9
NOX GRAMS/KM	.45	.02	.03	.02
FUEL CONSUMPTION BY CB L/100KM	15.98	13.98	13.05	13.71
RUN TIME SECONDS	505	867	505	867
AVG, EXH. OXYGEN PERCENT	3.39	3.29	2.77	3.26
CATALYST AVG, TEMP. DEG, C	228	556	521	596
CATALYST MAX, TEMP. DEG, C	529	619	647	650
MEASURED DISTANCE KM	5.70	6.19	5.70	6.17
DFC, WET (DRY)	.918 (.908)		.922 (.912)	
SCF, WET (DRY)	1.000 (.982)		1.000 (.982)	
VOL (SCM)	204.2		205.8	
KM (MEASURED)	11.89		11.87	

COMPOSITE RESULTS

TEST NUMBER		42D2-2
BAROMETER	MM HG	736.9
HUMIDITY	G/KG	9.2
TEMPERATURE	DEG C	22.2

TOTAL FUEL SULFUR	MG/KM	29.52
AVG, EXH, OXYGEN	PCT	3.28
CATALYST AVG, TEMP.	DEG C	596
CATALYST MAX, TEMP.	DEG C	647

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	220.3	(222.5)
FUEL CONSUMPTION	L/100KM	13.77	(13.89)
HYDROCARBONS (THC)	G/KM	7.88	(7.73)
CARBON MONOXIDE	G/KM	99.23	(99.20)
OXIDES OF NITROGEN	G/KM	.11	(.11)

TABLE B-18. TEST 42E1-1 EMISSIONS RESULTS

PVM - 82E FTP VEHICLE EMISSIONS RESULTS - FULL LEAN
PROJECT 11-9989-001

TEST NO. 82E1-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION 4A
GVW 1720 KG(3791 LBS)

VEHICLE NO. 82
DATE 8/31/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 2826 KM(1756 MILES)

BAROMETER 742.70 MM HG(29.24 IN HG)
RELATIVE HUMIDITY 67 PCT
DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 9.7 GM/KG

NOX HUMIDITY CORRECTION FACTOR .97

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H20(IN. H20)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	90719	69629	90665	69699
CVS FLOW STD. CU. METRES(SCF)	76.6 (2705.6)	131.1 (9628.8)	76.5 (2701.9)	131.0 (9627.1)
HC SAMPLE METER/RANGE/PPM	10.3/ 3/ 103	9.9/ 2/ 10	12.1/ 2/ 12	9.1/ 2/ 9
HC BCKGRD METER/RANGE/PPM	.9/ 3/ 9	8.8/ 2/ 9	8.1/ 2/ 8	8.0/ 2/ 8
CO SAMPLE METER/RANGE/PPM	88.8/12/ 212	5.2/13/ 5	19.7/13/ 19	2.1/13/ 2
CO BCKGND METER/RANGE/PPM	2.9/12/ 9	3.9/13/ 9	1.9/13/ 2	1.7/13/ 2
CO2 SAMPLE METER/RANGE/PCT	66.5/ 3/ 1.19	91.9/ 3/ .71	56.7/ 3/ 1.00	91.0/ 3/ .70
CO2 BCKGND METER/RANGE/PCT	3.5/ 3/ .05	3.9/ 3/ .05	3.3/ 3/ .05	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	51.9/ 2/ 52	12.9/ 2/ 12	39.0/ 2/ 39	12.8/ 2/ 13
NOX BCKGRD METER/RANGE/PPM	.5/ 2/ 1	.1/ 2/ 0	.9/ 2/ 0	.6/ 2/ 1
DILUTION FACTOR	10.95	10.75	13.90	14.21
HC CONCENTRATION PPM	95	2	5	2
CO CONCENTRATION PPM	199	1	12	0
CO2 CONCENTRATION PCT	1.19	.66	.95	.69
NOX CONCENTRATION PPM	51.9	12.3	33.6	12.2
HC MASS GRAMS	9.19	.12	.20	.11
CO MASS GRAMS	17.78	.21	1.09	.07
CO2 MASS GRAMS	1605.5	1593.3	1332.2	1538.1
NOX MASS GRAMS	7.30	2.99	9.77	2.97
HC GRAMS/KM	.79	.02	.09	.02
CO GRAMS/KM	3.13	.03	.18	.01
CO2 GRAMS/KM	282.9	261.5	233.9	252.2
NOX GRAMS/KM	1.28	.99	.84	.99
FUEL CONSUMPTION BY CB L/100KM	12.36	11.17	10.00	10.77
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	9.56	5.61	9.93	5.79
CATALYST AVG. TEMP. DEG. C	295	493	402	500
CATALYST MAX. TEMP. DEG. C	478	513	499	521
MEASURED DISTANCE KM	5.68	6.09	5.70	6.10
DFC, WET (DRY)	.933 (.922)		.990 (.928)	
SCF, WET (DRY)	1.000 (.988)		1.000 (.981)	
VOL (SCM)	207.9		207.5	
KM (MEASURED)	11.78		11.79	

COMPOSITE RESULTS

TEST NUMBER		82E1-1
BAROMETER	MM HG	742.7
HUMIDITY	G/KG	9.7
TEMPERATURE	DEG C	22.2

TOTAL FUEL SULFUR	MG/KM	23.78
AVG. EXH. OXYGEN	PCT	
CATALYST AVG. TEMP.	DEG C	935
CATALYST MAX. TEMP.	DEG C	513

		3-BAG	(9-BAG)
CARBON DIOXIDE	G/KM	258.2	(255.5)
FUEL CONSUMPTION	L/100KM	11.09	(10.98)
HYDROCARBONS (THC)	G/KM	.17	(.17)
CARBON MONOXIDE	G/KM	.72	(.71)
OXIDES OF NITROGEN	G/KM	.75	(.76)

TABLE B-19. TEST 42F2-1 EMISSIONS RESULTS

PVM - 42F FTP VEHICLE EMISSIONS RESULTS - MAX, RICH IDLE W/O O
PROJECT 11-4484-001

TEST NO. 42F2-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 9/ 1/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-3404
ODOMETER 2852 KM(1772 MILES)

BAROMETER 749.30 MM HG(29.49 IN HG)
RELATIVE HUMIDITY 69 PCT

DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 11.8 GM/KG

NOX HUMIDITY CORRECTION FACTOR 1.04

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	40.6 (105.0)	42.2 (108.0)
BLOWER REVOLUTIONS	40220	64686	40605	64547
CVS FLOW STD. CU. METRES(SCF)	76.8 (2711.3)	131.3 (4638.2)	76.6 (2706.2)	130.8 (4620.8)
HC SAMPLE METER/RANGE/PPM	31.5/ 3/ 315	18.3/ 3/ 183	21.6/ 3/ 216	16.5/ 3/ 165
HC BCKGRD METER/RANGE/PPM	1.0/ 3/ 10	1.2/ 3/ 12	1.7/ 3/ 17	1.5/ 3/ 15
CO SAMPLE METER/RANGE/PPM	80.3/ 2/ 9642	56.7/ 2/ 2825	69.3/ 2/ 3333	91.3/ 3/ 2583
CO BCKGRD METER/RANGE/PPM	.1/ 2/ 9	.3/ 2/ 11	.3/ 2/ 11	.4/ 3/ 19
CO2 SAMPLE METER/RANGE/PCT	55.0/ 3/ .96	35.9/ 3/ .59	45.6/ 3/ .78	32.8/ 3/ .55
CO2 BCKGRD METER/RANGE/PCT	2.5/ 3/ .09	3.6/ 3/ .06	3.5/ 3/ .05	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	23.6/ 2/ 89	9.9/ 2/ 9	9.1/ 2/ 9	3.2/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.0/ 2/ 0	.6/ 2/ 1	.9/ 2/ 0	.9/ 2/ 0
DILUTION FACTOR	9.30	15.15	11.51	16.50
HC CONCENTRATION PPM	306	172	200	151
CO CONCENTRATION PPM	9649	2719	3583	2486
COP CONCENTRATION PCT	.43	.59	.73	.99
NOX CONCENTRATION PPM	23.9	9.3	8.7	2.8
HC MASS GRAMS	13.55	13.01	8.86	11.39
CO MASS GRAMS	397.71	415.80	319.70	378.71
CO2 MASS GRAMS	1307.7	1302.2	1029.9	1180.1
NOX MASS GRAMS	3.69	1.13	1.33	.73
HC GRAMS/KM	2.37	2.13	1.55	1.86
CO GRAMS/KM	69.53	67.96	55.89	61.96
CO2 GRAMS/KM	228.6	212.8	179.9	193.1
NOX GRAMS/KM	.62	.18	.23	.12
FUEL CONSUMPTION BY CB L/100KM	14.79	13.93	11.63	12.65
RUN TIME SECONDS	504	867	506	867
AVG. EXH. OXYGEN PERCENT	3.22	3.88	3.69	3.92
CATALYST AVG. TEMP. DEG. C	169	381	293	393
CATALYST MAX. TEMP. DEG. C	359	397	387	419
MEASURED DISTANCE KM	5.72	6.12	5.73	6.11
DFC, WET (DRY)	.919 (.909)		.938 (.915)	
SCF, WET (DRY)	1.000 (.977)		1.000 (.978)	
VOL (SCM)	208.1		207.9	
KM (MEASURED)	11.89		11.89	

COMPOSITE RESULTS

TEST NUMBER		42F2-1
BAROMETER	MM HG	748.7
HUMIDITY	G/KG	11.8
TEMPERATURE	DEG C	22.2

TOTAL FUEL SULFUR	MG/KM	28.86
AVG. EXH. OXYGEN	PCT	3.73
CATALYST AVG. TEMP.	DEG C	329
CATALYST MAX. TEMP.	DEG C	397

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	207.0	(201.2)
FUEL CONSUMPTION	L/100KM	13.47	(13.09)
HYDROCARBONS (THC)	G/KM	2.02	(1.99)
CARBON MONOXIDE	G/KM	69.95	(63.18)
OXIDES OF NITROGEN	G/KM	.29	(.27)

TABLE B-20. TEST 42G2-1 EMISSIONS RESULTS

PVM - 42G FTP VEHICLE EMISSIONS RESULTS - MAXIMUM RICH
PROJECT 11-42G2-001

TEST NO. 42G2-1 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 4/ 7/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-349
ODOMETER 2913 KM(1810 MILES)

BAROMETER 738.63 MM HG(29.08 IN HG)
RELATIVE HUMIDITY 56 PCT
BAG RESULTS

DRY BULB TEMP. 21.7 DEG C(71.0 DEG F)
ABS. HUMIDITY 9.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .96

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)	749.3 (29.5)	774.7 (30.5)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	762.0 (30.0)	774.7 (30.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	90585	64580	90699	64700
CVS FLOW STD. CU. METRES(SCF)	76.0 (2689.9)	129.9 (4588.2)	75.8 (2678.8)	130.9 (4609.8)
HC SAMPLE METER/RANGE/PPM	23.2/ 3/ 232	19.3/ 3/ 193	18.6/ 3/ 186	13.0/ 3/ 130
HC BCKGRD METER/RANGE/PPM	2.2/ 3/ 22	2.1/ 3/ 21	1.7/ 3/ 17	1.6/ 3/ 16
CO SAMPLE METER/RANGE/PPM	81.9/ 2/ 9789	69.9/ 2/ 2673	72.0/ 2/ 3995	89.8/ 3/ 2993
CO BCKGRD METER/RANGE/PPM	.8/ 2/ 19	.5/ 2/ 19	.3/ 2/ 11	.6/ 3/ 19
CO2 SAMPLE METER/RANGE/PCT	55.9/ 3/ .98	37.6/ 3/ .63	51.7/ 3/ .90	36.9/ 3/ .62
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06	4.7/ 3/ .07	4.7/ 3/ .07	4.8/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	29.7/ 2/ 88	9.2/ 2/ 9	10.9/ 2/ 10	3.0/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	.9/ 2/ 1	.7/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	9.12	14.78	10.31	15.31
HC CONCENTRATION PPM	252	123	171	115
CO CONCENTRATION PPM	9589	2579	3795	2905
CO2 CONCENTRATION PCT	.93	.57	.83	.55
NOX CONCENTRATION PPM	23.7	3.9	9.8	2.3
HC MASS GRAMS	11.07	9.25	7.96	8.65
CO MASS GRAMS	906.27	389.91	335.07	365.19
CO2 MASS GRAMS	1298.8	1396.3	1159.0	1316.6
NOX MASS GRAMS	3.30	.80	1.36	.56
HC GRAMS/KM	1.93	1.51	1.30	1.41
CO GRAMS/KM	70.89	63.50	58.96	59.63
CO2 GRAMS/KM	225.6	219.5	202.2	215.0
NOX GRAMS/KM	.58	.13	.24	.09
FUEL CONSUMPTION AV CB L/100KM	14.64	13.88	12.73	13.37
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	2.65	3.53	2.82	3.48
CATALYST AVG. TEMP. DEG. C	180	388	327	907
CATALYST MAX. TEMP. DEG. C	967	910	919	931
MEASURED DISTANCE KM	5.73	6.13	5.73	6.12
DFC. WET (DRY)	.917 (.906)		.923 (.912)	
SCF. WET (DRY)	1.000 (.981)		1.000 (.982)	
VOL (SCM)	205.9		206.2	
KM (MEASURED)	11.86		11.84	

COMPOSITE RESULTS

TEST NUMBER		42G2-1
BAROMETER	MM HG	738.6
HUMIDITY	G/KG	9.9
TEMPERATURE	DEG C	21.7

TOTAL FUEL SULFUR	MG/KM	29.36
AVG. EXH. OXYGEN	PCT	3.25
CATALYST AVG. TEMP.	DEG C	392
CATALYST MAX. TEMP.	DEG C	919

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	216.0	(219.7)
FUEL CONSUMPTION	L/100KM	13.70	(13.56)
HYDROCARBONS (THC)	G/KM	1.54	(1.51)
CARBON MONOXIDE	G/KM	63.65	(62.51)
OXIDES OF NITROGEN	G/KM	.25	(.29)

APPENDIX C

SUMMARIES OF THE RESULTS

TABLE C-1. CAR 411 - DISABLED OXYGEN SENSOR
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	411-11	411-12	411-13	411-21	411-22	411-23	411-31	411-32	411-33
Barometer, mm Hg	743.2	743.7	743.7	749.0	750.1	750.1	745.7	745.7	745.7
Humidity, g/kg	10.2	9.2	9.4	5.2	6.9	6.9	6.4	8.1	7.4
Temperature, °C	22.8	23.3	24.4	26.7	25.6	25.6	23.9	22.8	24.4
Total Fuel Sulfur, mg/km	23.80	19.25	17.57	26.37	21.55	20.31	25.27	21.30	20.70
Avg. Exh. Oxygen, %	5.85	5.69	5.16	5.60	5.28	4.22	5.43	5.41	4.21
Catalyst Avg. Temp., °C	424.	485.	518.	536.	633.	716.	--	596.	688.
Catalyst Max. Temp., °C	499.	554.	563.	752.	791.	796.	669.	769.	802.
Carbon Dioxide, g/km	257.8	210.4	191.9	284.3	234.4	221.3	273.8	231.8	225.4
Fuel Cons., ℓ/100 km	11.11	8.98	8.20	12.30	10.05	9.48	11.79	9.94	9.66
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.07	0.01	0.01	0.10	0.04	0.03	0.09	0.05	0.04
Carbon Monoxide, g/km	1.39	0.03	0.05	2.33	0.65	0.46	1.38	0.57	0.43
Oxides of Nitrogen, g/km	0.44	0.80	0.94	0.26	0.36	0.38	0.33	0.41	0.39
Particulates									
Total Particulates	11.83	5.89	6.36	3.29	13.44	7.81	2.46	27.34	12.68
Sulfate	3.02	1.23	3.49	0.83	11.28	7.87	1.23	16.38	11.66
Sulfate as % of TFS, %	4.23	2.13	6.62	1.05	17.45	12.92	1.62	25.63	18.78
Compound Group Totals									
Aldehydes & Ketones	3.9	1.9	3.4	0.5	1.0	0.7	0.8	0.2	0.8
Individual Hydrocarbons	--	--	--	109.4	49.5	39.5	77.8	53.5	45.2
Organic Sulfides	0.62	0.06	0.27	--	0.08	0.06	0.13	0.04	0.06
Organic Amines	0.11	0.04	0.01	0.04	0.09	0.05	0.02	0.00	0.00
Other Compounds									
Ammonia	--	--	--	14.08	--	--	6.28	--	--
Cyanide & Cyanogen	--	--	--	--	--	--	--	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	--	--	--	15.46	8.52	3.73	17.07	10.10	4.30

TABLE C-1 (Cont'd). CAR 411 - DISABLED OXYGEN SENSOR
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	411-11	411-12	411-13	411-21	411-22	411-23	411-31	411-32	411-33
Aldehydes and Ketones									
Formaldehyde	3.14	0.80	2.89	0.00	0.05	0.14	0.00	0.00	0.28
Acetaldehyde	0.00	0.28	0.00	0.00	0.72	0.25	0.03	0.00	0.17
Acetone	0.14	0.07	0.12	0.00	0.00	0.00	0.27	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.24	0.07	0.20	0.24	0.04	0.06	0.21	0.08	0.14
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.34	0.68	0.17	0.25	0.16	0.25	0.26	0.11	0.17
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	3.9	1.9	3.4	0.5	1.0	0.7	0.8	0.2	0.8
Total as % of THC, %	5.6	19.0	34.0	0.5	2.5	2.3	0.9	0.4	2.0
Individual Hydrocarbons									
Methane	--	--	--	83.10	44.27	36.28	60.99	48.52	41.46
Ethylene	--	--	--	4.90	0.63	0.87	2.40	0.46	0.90
Ethane	--	--	--	8.31	2.65	1.24	5.80	3.38	2.43
Acetylene	--	--	--	1.51	0.00	0.00	0.81	0.00	0.00
Propane	--	--	--	3.62	1.09	0.70	1.70	0.76	0.34
Propylene	--	--	--	1.61	0.00	0.00	0.74	0.00	0.00
Benzene	--	--	--	3.82	0.54	0.40	2.68	0.35	0.03
Toluene	--	--	--	2.56	0.00	0.00	2.64	0.00	0.00
Total Individual HC	--	--	--	109.4	49.5	39.5	77.8	53.5	45.2
Total as % of THC, %	--	--	--	--	--	--	--	--	--
Organic Sulfides									
Carbonyl Sulfide	0.56	0.01	0.137	--	0.05	0.02	0.11	0.02	0.03
Methyl Sulfide	0.05	0.04	0.136	--	0.02	0.02	0.02	0.02	0.02
Ethyl Sulfide	0.00	0.00	0.000	--	0.00	0.01	0.00	0.00	0.01
Methyl Disulfide	0.00	0.00	0.000	--	0.01	0.01	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.03	0.04	0.01	0.01	0.01	0.01	0.02	0.00	0.00
Monoethylamine	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.02	0.00	0.00	0.03	0.08	0.04	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-1 (Cont'd). CAR 411 - DISABLED OXYGEN SENSOR
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		411-11	411-12	411-13	411-21	411-22	411-23	411-31	411-32	411-33
Trace Elements										
Chromium	Cr									
Lead	Pb	0.11	0.18	0.12						
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.03	0.05		0.03	0.05				
Phosphorus	P	0.01	0.01					0.01	0.01	0.01
Silicon	Si	0.01	0.01		0.01	0.01	0.01	0.01		
Cadmium	Cd									
Aluminum	Al	0.05	0.03	0.01	0.03	0.02	0.05	0.03	0.01	0.01
Sulfur	S	1.42	1.13	1.71	0.25	4.72	0.44	2.20	6.29	4.62
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0.01	0.01		0.01		0.01	0.01		
Potassium	K									
Chlorine	Cl				0.01					
Platinum	Pt									
Zinc	Zn	0.02	0.02	0.01	0.01	0.01	0.02	0.01		
Copper	Cu	0.02	0.02							
Nickel	Ni	0.04								
Iron	Fe	0.27	0.08	0.04	0.22	0.11	0.16	0.27	0.09	0.04
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01
Calcium	Ca	0.01	0.01	0.01	0.01			0.01		

TABLE C-2. CAR 412 - TWELVE PERCENT IGNITION MISFIRE
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	412-11	412-12	412-13	412-21	412-22	412-23	412-31	412-32	412-33
Barometer, mm Hg	744.7	745.2	745.2	751.3	752.6	751.3	751.8	751.8	751.8
Humidity, g/kg	3.9	3.4	4.1	8.5	7.1	6.0	3.8	5.3	4.1
Temperature, °C	21.7	22.8	23.9	21.7	25.0	16.7	24.4	25.0	25.0
Total Fuel Sulfur, mg/km	23.96	18.31	16.54	24.50	20.70	18.24	23.54	20.26	18.31
Avg. Exh. Oxygen, %	--	--	--	6.75	6.10	5.15	6.40	5.84	4.73
Catalyst Avg. Temp., °C	397.	474.	508.	536.	630.	688.	539.	603.	668.
Catalyst Max. Temp., °C	504.	529.	542.	713.	749.	765.	769.	721.	743.
Carbon Dioxide, g/km	258.8	200.0	180.8	262.5	225.9	199.2	252.7	221.3	200.0
Fuel Cons., ℓ/100 km	11.18	8.54	7.72	11.43	9.66	8.51	10.98	9.45	8.54
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.08	0.02	0.01	0.40	0.01	0.01	0.36	0.01	0.01
Carbon Monoxide, g/km	1.84	0.02	0.02	2.60	0.25	0.09	2.22	0.09	0.05
Oxides of Nitrogen, g/km	0.49	0.69	0.76	0.31	0.18	0.10	0.28	0.32	0.12
Particulates									
Total Particulates	11.07	1.85	9.20	5.55	11.09	11.91	7.51	16.68	13.34
Sulfate	4.61	1.05	6.67	0.55	4.02	5.68	1.04	4.98	5.23
Sulfate as % of TFS, %	6.41	1.91	13.44	0.75	6.47	10.38	1.47	8.19	9.52
Compound Group Totals									
Aldehydes & Ketones	0.1	4.2	4.4	0.00	0.00	0.00	0.0	0.0	0.0
Individual Hydrocarbons	52.9	13.8	7.7	96.0	25.1	19.0	108.7	6.8	11.3
Organic Sulfides	1.02	0.01	0.00	0.24	0.13	0.02	0.12	0.05	0.17
Organic Amines	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Other Compounds									
Ammonia	5.04			6.53			--		
Cyanide & Cyanogen	0.00			0.08			0.11		
DMNA									
Hydrogen Sulfide	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Nickel Carbonyl	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	18.94	9.20	8.11	9.31	3.39	1.28	9.38	3.26	1.58

TABLE C-2(Cont'd). CAR 412 - TWELVE PERCENT IGNITION MISFIRE
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	412-11	412-12	412-13	412-21	412-22	412-23	412-31	412-32	412-33
Aldehydes and Ketones									
Formaldehyde	0.00	4.16	4.31	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.1	4.2	4.4	0.00	0.00	0.00	0.0	0.0	0.0
Total as % of THC, %	0.1	21.0	44.0	0.00	0.00	0.00	0.0	0.0	0.0
Individual Hydrocarbons									
Methane	37.45	12.66	7.64	28.08	14.97	14.70	21.21	5.85	9.40
Ethylene	2.88	0.00	0.00	8.44	1.30	1.23	5.72	0.00	0.57
Ethane	2.73	1.10	0.09	2.59	1.64	1.32	2.24	0.98	1.28
Acetylene	2.35	0.00	0.00	4.44	6.47	0.95	36.12	0.00	0.00
Propane	0.06	0.00	0.00	0.87	0.12	0.17	0.45	0.00	0.00
Propylene	1.09	0.00	0.00	2.86	0.11	0.16	2.61	0.00	0.00
Benzene	2.93	0.00	0.00	13.73	0.44	0.47	10.69	0.00	0.00
Toluene	3.45	0.00	0.00	34.95	0.00	0.03	29.65	0.00	0.00
Total Individual HC	52.9	13.8	7.7	96.0	25.1	19.0	108.7	6.8	11.3
Total as % of THC, %	66.1	69.0	77.0	24.0	251.0	191.0	30.2	68.0	113.0
Organic Sulfides									
Carbonyl Sulfide	0.77	0.01	0.00	0.18	0.11	0.01	0.10	0.02	0.15
Methyl Sulfide	0.25	0.00	0.00	0.02	0.02	0.01	0.02	0.03	0.02
Ethyl Sulfide	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Trimethylamine	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-2 (Cont'd). CAR 412 - TWELVE PERCENT IGNITION MISFIRE
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		412-11	412-12	412-13	412-21	412-22	412-23	412-31	412-32	412-33
Trace Elements										
Chromium	Cr									
Lead	Pb	0.17			0.12	0.11	0.12	0.20		
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.06	0.04		0.08	0.03		0.05		0.04
Phosphorus	P	0.01			0.01	0.01		0.02	0.01	0.01
Silicon	Si	0.02	0.01		0.03	0.02		0.03	0.02	
Cadmium	Cd									
Aluminum	Al	0.05	0.01	0.01	0.07	0.04	0.01	0.08	0.04	0.02
Sulfur	S	1.93	0.45	3.29	0.23	2.19	3.78	0.50	4.38	5.29
Sodium	Na							0.01		
Fluorine	F									
Magnesium	Mg	0.01	0.01		0.01	0.01		0.02	0.01	0.01
Potassium	K									
Chlorine	Cl							0.01		
Platinum	Pt									
Zinc	Zn	0.01	0.01		0.02	0.02	0.01	0.04	0.02	
Copper	Cu									
Nickel	Ni									
Iron	Fe	1.68	0.32	0.12	2.43	1.41	0.16	3.54	1.06	0.33
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.03	0.02	0.01	0.04	0.03	0.01	0.07	0.04	0.02
Calcium	Ca	0.02	0.01		0.01	0.01		0.01		

TABLE C-3. CAR 413 - DISABLED EGR AND O_2
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	413-11	413-12	413-13	413-21	413-22	413-23	413-31	413-32	413-33
Barometer, mm Hg	752.9	753.1	752.6	749.0	748.8	748.8	746.5	745.0	745.0
Humidity, g/kg	2.9	3.7	3.2	2.4	2.9	2.5	5.0	6.6	7.0
Temperature, °C	23.9	24.4	24.4	23.9	23.9	25.0	24.4	25.0	25.6
Total Fuel Sulfur, mg/km	23.76	18.23	16.19	25.48	20.82	18.91	25.25	20.42	18.02
Avg. Exh. Oxygen, %	--	6.38	5.91	5.94	5.32	4.22	5.91	5.27	4.40
Catalyst Avg. Temp., °C	--	463	500	510	--	--	--	--	--
Catalyst Max. Temp., °C	--	542	546	769	769	787	713	743	747
Carbon Dioxide, g/km	257.9	199.3	176.9	275.1	225.1	205.1	273.3	221.1	195.6
Fuel Cons., ℓ/100 km	11.09	8.51	7.55	11.89	9.72	8.82	11.78	9.53	8.41
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.06	0.01	0.01	0.12	0.07	0.05	0.11	0.06	0.05
Carbon Monoxide, g/km	1.04	0.01	0.01	1.96	1.52	0.96	1.53	1.24	0.79
Oxides of Nitrogen, g/km	0.48	0.68	0.62	0.73	0.81	0.82	0.73	0.81	0.85
Particulates									
Total Particulates	30.03	4.72	17.06	35.00	22.42	4.95	4.48	16.54	6.76
Sulfate	1.79	2.15	9.00	22.02	4.13	16.75	2.47	3.75	1.99
Sulfate as % of TFS, %	2.51	3.93	18.53	28.78	6.61	29.52	3.26	6.12	3.68
Compound Group Totals									
Aldehydes & Ketones	0.0	3.4	3.2	0.0	0.0	0.0	1.0	0.0	0.0
Individual Hydrocarbons	33.6	8.9	4.6	91.6	55.5	42.0	85.2	58.1	46.1
Organic Sulfides	--	--	--	0.23	0.13	0.00	0.10	0.00	0.48
Organic Amines	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.04
Other Compounds									
Ammonia	9.33	--	--	16.33	--	--	10.11	--	--
Cyanide & Cyanogen	0.00	--	--	0.00	--	--	0.00	--	--
DMNA									
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	16.51	10.96	5.54	80.38	45.82	17.33	78.50	40.91	23.54

TABLE C-3 (Cont'd). CAR 412 - DISABLED EGR AND O_2
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	413-11	413-12	413-13	413-21	413-22	413-23	413-31	413-32	413-33
Aldehydes and Ketones									
Formaldehyde	0.00	3.4	3.21	0.00	0.00	0.00	0.95	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.0	3.4	3.2	0.0	0.0	0.0	1.0	0.0	0.0
Total as % of THC, %	0.0	3.4	32.0	0.0	0.0	0.0	0.9	0.0	0.0
Individual Hydrocarbons									
Methane	21.64	8.59	4.29	73.35	49.65	38.49	70.86	52.31	42.03
Ethylene	3.85	0.02	0.10	2.59	0.78	0.85	2.36	0.74	0.50
Ethane	1.54	0.25	0.19	6.32	3.40	2.04	6.61	3.90	2.74
Acetylene	2.18	0.00	0.00	0.87	0.00	0.00	0.83	0.00	0.0
Propane	0.00	0.00	0.01	0.24	0.06	0.08	0.00	0.00	0.02
Propylene	1.00	0.01	0.05	0.87	0.00	0.08	0.64	0.00	0.00
Benzene	1.76	0.00	0.00	3.58	1.50	0.50	2.50	1.11	0.77
Toluene	1.64	0.00	0.00	3.76	0.11	0.00	1.35	0.00	0.00
Total Individual HC	33.6	8.9	4.6	91.6	55.5	42.0	85.2	58.1	46.1
Total as % of THC, %	56.0	89.0	46.4	76.3	79.3	84.0	77.5	96.8	92.2
Organic Sulfides									
Carbonyl Sulfide	--	--	--	0.04	0.00	0.00	0.00	0.00	0.00
Methyl Sulfide	--	--	--	0.16	0.13	0.00	0.10	0.00	0.48
Ethyl Sulfide	--	--	--	0.03	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Monoethylamine	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-3 (Cont'd). CAR 413 - DISABLED EGR AND O_2
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		413-11	413-12	413-13	413-21	413-22	413-23	413-31	413-32	413-33
Trace Elements										
Chromium	Cr									
Lead	Pb	0.26	0.10	0.13	0.33	0.25	0.18			
Manganese	Mn				0.03	0.03		0.01		
Arsenic	As									
Mercury	Hg									
Bromine	Br				0.04	0.06				
Phosphorus	P	0.01	0.01	0.01	0.03	0.08	0.01	0.01	0.01	
Silicon	Si	0.02			0.03	0.01		0.03	0.01	
Cadmium	Cd									
Aluminum	Al	0.04	0.01		0.06	0.03	0.01	0.04	0.01	
Sulfur	S	6.84	0.86	5.06	3.51	7.43	7.52	0.74	6.11	4.15
Sodium	Na				0.01	0.02				
Fluorine	F									
Magnesium	Mg	0.01	0.01		0.01	0.04	0.01	0.01	0.01	
Potassium	K							0.01		
Chlorine	Cl				0.08	0.19		0.02	0.01	
Platinum	Pt									
Zinc	Zn	0.01	0.01		0.04	0.14	0.02	0.02	0.02	0.01
Copper	Cu	0.03			0.03	0.03				
Nickel	Ni									
Iron	Fe	1.01	0.17	0.07	13.02	3.67	1.94	2.62	0.41	0.05
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.02	0.01	0.08	0.14	0.03	0.03	0.02	
Calcium	Ca	0.02	0.01		0.02	0.01	0.01	0.01	0.01	

TABLE C-4. CAR 415 - DISABLED O_2 SENSOR + AIR PUMP
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	415-11	415-12	415-13	415-21	415-22	415-23	415-31	415-32	415-33
Barometer, mm Hg	738.6	743.2	743.2	737.6	736.6	738.9	739.1	738.9	738.9
Humidity, g/kg	11.4	6.9	10.6	9.8	9.5	9.0	10.0	9.5	9.0
Temperature, °C	26.7	27.2	28.3	23.9	26.1	25.6	23.3	26.1	25.6
Total Fuel Sulfur, mg/km	23.81	18.34	17.17	25.21	22.23	21.56	24.54	20.51	18.80
Avg. Exh. Oxygen, %	6.80	5.94	4.75	1.19	--	0.14	1.29	0.81	0.23
Catalyst Avg. Temp., °C	430	496	532	384	485	540	404	489	529
Catalyst Max. Temp., °C	--	559	567	474	567	576	500	547	547
Carbon Dioxide, g/km	258.6	200.4	187.7	205.2	179.1	167.7	212.8	175.2	151.2
Fuel Cons., ℓ/100 km	11.11	8.56	8.01	11.76	10.37	10.06	11.45	9.57	8.77
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.06	0.01	0.01	1.28	0.96	0.93	1.04	0.65	0.72
Carbon Monoxide, g/km	0.91	0.04	0.03	42.20	38.70	41.37	33.23	29.84	33.10
Oxides of Nitrogen, g/km	0.46	0.57	0.69	0.13	0.19	0.17	0.08	0.10	0.10
Particulates									
Total Particulates	8.19	6.93	22.67	10.72	16.45	5.70	4.31	2.42	1.92
Sulfate	3.11	4.34	9.03	0.07	0.08	0.08	0.03	0.04	0.03
Sulfate as % of TFS, %	4.35	7.89	17.53	0.09	0.12	0.12	0.04	0.07	0.05
Compound Group Totals									
Aldehydes & Ketones	0.3	0.0	0.9	1.2	0.6	0.7	1.3	0.0	0.2
Individual Hydrocarbons	35.4	11.0	5.1	559.5	426.3	407.8	436.7	336.5	348.9
Organic Sulfides	0.70	0.84	0.15	1.47	6.45	4.69	0.14	5.63	4.43
Organic Amines	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.01	0.01
Other Compounds									
Ammonia	3.70	--	--	27.38	--	--	99.14	--	--
Cyanide & Cyanogen	0.14	0.01	0.09	13.87			6.41		
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.00	0.00	0.00	1.07	6.45	7.89	0.42	4.09	4.75
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	12.50	7.97	4.62	2.89	2.55	1.39	12.43	3.68	0.87

TABLE C-4 (Cont'd). CAR 415 - DISABLED O_2 SENSOR + AIR PUMP
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	415-11	415-12	415-13	415-21	415-22	415-23	415-31	415-32	415-33
Aldehydes and Ketones									
Formaldehyde	0.01	0.03	0.13	0.55	0.00	0.07	0.08	0.01	0.06
Acetaldehyde	0.00	0.00	0.00	0.28	0.25	0.36	0.95	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.51	0.00	0.00	0.00	0.18	0.00	0.00
Methyl Ethyl Ketone	0.26	0.00	0.24	0.32	0.26	0.27	0.11	0.00	0.09
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.3	0.0	0.9	1.2	0.6	0.7	1.3	0.0	0.2
Total as % of THC, %	0.5	0.0	9.0	0.1	0.1	0.1	0.1	0.0	0.0
Individual Hydrocarbons									
Methane	29.28	10.12	4.71	109.73	89.79	88.51	99.67	78.07	74.99
Ethylene	2.04	0.00	0.00	160.04	114.33	106.27	109.30	78.30	85.29
Ethane	1.71	0.72	0.31	16.57	13.01	11.82	11.50	11.57	10.81
Acetylene	0.40	0.00	0.00	9.45	0.00	0.08	4.76	0.10	0.08
Propane	0.15	0.00	0.00	2.33	1.84	1.38	1.61	3.78	1.03
Propylene	0.65	0.00	0.00	65.25	54.57	52.78	43.95	36.83	40.56
Benzene	1.04	0.00	0.00	73.86	58.27	56.28	78.33	63.28	64.91
Toluene	0.09	0.11	0.08	122.23	94.46	90.68	87.53	64.59	71.20
Total Individual HC	35.4	11.0	5.1	559.5	426.3	407.8	436.7	336.5	348.9
Total as % of THC, %	59.0	110.0	51.0	43.7	44.4	43.8	42.0	51.8	48.5
Organic Sulfides									
Carbonyl Sulfide	0.70	0.84	0.10	1.31	6.24	4.58	0.05	5.47	4.15
Methyl Sulfide	0.00	0.03	0.05	0.15	0.12	0.04	0.00	0.02	0.10
Ethyl Sulfide	0.00	0.00	0.00	0.01	0.09	0.07	0.09	0.11	0.18
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Monoethylamine	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-4 (Cont'd). CAR 415 - DISABLED O_2 SENSOR + AIR PUMP
1978 FORD PINTO - THREE-WAY PLUS OXIDATION CATALYSTS

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		415-11	415-12	415-13	415-21	415-22	415-23	415-31	415-32	415-33
Trace Elements										
Chromium	Cr									
Lead	Pb				0.11					
Manganese	Mn									No Data for this Test
Arsenic	As									
Mercury	Hg									
Bromine	Br					0.05	0.06			
Phosphorus	P	0.01	0.01	0.01		0.01			0.01	
Silicon	Si		0.01		0.01	0.01			0.01	
Cadmium	Cd									
Aluminum	Al	0.02	0.01			0.01		0.01		
Sulfur	S	1.04	1.84	5.66	0.01	0.03	0.02	0.01	0.01	
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0.01	0.01		0.01	0.01		0.01	0.01	
Potassium	K									
Chlorine	Cl	0.03	0.12	0.02	0.04	0.20	0.03	0.02	0.07	
Platinum	Pt									
Zinc	Zn		0.02			0.02	0.02	0.01		
Copper	Cu									
Nickel	Ni									
Iron	Fe	0.24	0.11	0.05	0.12	0.09	0.04	0.08	0.05	
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.02	
Calcium	Ca	0.01	0.01	0.01	0.01	0.02		0.01	0.01	

TABLE C-5. CAR 421 - DISABLED OXYGEN SENSOR
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	421-11	421-12	421-13	421-21	421-22	421-23	421-31	421-32	421-33
Barometer, mm Hg	743.5	743.7	743.7	743.7	743.2	743.2	739.6	739.1	739.1
Humidity, g/kg	10.2	9.7	8.1	7.3	7.7	7.7	12.4	11.9	11.4
Temperature, °C	22.8	23.9	24.4	23.3	23.9	23.9	22.8	23.9	23.3
Total Fuel Sulfur, mg/km	23.59	19.01	16.63	26.90	21.60	19.87	27.60	22.27	19.95
Avg. Exh. Oxygen, %	1.23	1.62	--	--	0.52	--	0.91	0.48	0.05
Catalyst Avg. Temp., °C	432.	551.	595.	--	413.	488.	356.	436.	493.
Catalyst Max. Temp., °C	517.	644.	636.	431.	529.	546.	410.	512.	533.
Carbon Dioxide, g/km	253.0	207.0	181.6	202.1	164.7	152.7	203.7	167.3	150.1
Fuel Cons., ℓ/100 km	11.01	8.87	7.76	12.55	10.08	9.27	12.88	10.39	9.31
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.18	0.01	0.01	1.45	0.97	0.81	1.49	1.00	0.85
Carbon Monoxide, g/km	2.80	0.54	0.13	55.59	43.49	39.45	59.40	46.45	41.55
Oxides of Nitrogen, g/km	0.41	0.30	0.29	0.13	0.06	0.04	0.13	0.05	0.03
Particulates									
Total Particulates	5.75	4.74	2.10	10.08	9.41	7.61	12.12	10.26	8.64
Sulfate	0.15	0.27	0.17	0.34	0.22	0.21	0.30	0.17	0.20
Sulfate as % of TFS, %	0.21	0.47	0.34	0.42	0.34	0.35	0.36	0.25	0.33
Compound Group Totals									
Aldehydes & Ketones	1.3	0.4	2.6	4.9	2.0	3.5	2.6	0.9	2.0
Individual Hydrocarbons	96.5	16.6	8.7	711.3	522.2	433.2	790.9	534.8	442.9
Organic Sulfides	0.43	0.06	0.06	1.67	0.89	0.90	1.07	1.05	0.86
Organic Amines	0.01	0.00	0.01	0.02	0.00	0.00	0.01	0.00	0.00
Other Compounds									
Ammonia	16.45	--	--	74.24	--	--	61.95	--	--
Cyanide & Cyanogen	--	--	--	3.87	--	--	4.39	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.07	0.06	0.04	0.89	2.08	3.12	1.22	2.08	2.76
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	5.53	1.01	0.70	4.54	1.82	0.30	2.52	1.52	0.47

TABLE C-5 (Cont'd). CAR 421 - DISABLED OXYGEN SENSOR
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	421-11	421-12	421-13	421-21	421-22	421-23	421-31	421-32	421-33
Aldehydes and Ketones									
Formaldehyde	0.54	0.02	0.24	1.16	0.23	0.48	0.32	0.11	0.21
Acetaldehyde	0.18	0.00	2.01	2.49	1.16	2.02	1.52	0.55	1.04
Acetone	0.00	0.00	0.00	0.52	0.24	0.64	0.28	0.00	0.29
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.28	0.15	0.14	0.31	0.18	0.11	0.21	0.07	0.14
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.33	0.18	0.17	0.40	0.22	0.24	0.31	0.14	0.32
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	1.3	0.4	2.6	4.9	2.0	3.5	2.6	0.9	2.0
Total as % of THC, %	0.7	4.0	26.0	0.3	0.2	0.4	0.2	0.1	0.2
Individual Hydrocarbons									
Methane	40.25	12.91	7.61	162.28	120.77	98.89	209.89	128.99	106.31
Ethylene	13.65	0.69	0.00	204.00	145.50	110.88	226.10	149.39	110.85
Ethane	4.85	1.76	1.07	16.13	13.65	11.72	18.81	13.58	11.75
Acetylene	8.49	0.00	0.00	11.46	0.11	0.00	14.05	0.42	0.08
Propane	0.92	0.00	0.00	1.84	0.89	1.32	2.10	1.25	1.18
Propylene	6.67	0.00	0.00	77.43	61.18	51.87	81.12	62.16	51.10
Benzene	9.45	1.27	0.03	96.34	75.67	70.56	96.01	76.78	71.66
Toluene	12.23	0.00	0.00	141.84	104.41	87.99	142.81	102.22	89.95
Total Individual HC	96.5	16.6	8.7	711.3	522.2	433.2	790.9	534.8	442.9
Total as % of THC, %	53.6	--	--	49.1	53.8	53.5	53.1	53.5	52.1
Organic Sulfides									
Carbonyl Sulfide	0.31	0.05	0.03	1.60	0.85	0.88	1.03	0.97	0.81
Methyl Sulfide	0.12	0.01	0.03	0.04	0.01	0.02	0.04	0.04	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.04
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.01	0.02	0.00	0.00	0.01	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-5 (Cont'd). CAR 421 - DISABLED OXYGEN SENSOR
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		421-11	421-12	421-13	421-21	421-22	421-23	421-31	421-32	421-33
Trace Elements										
Chromium	Cr									
Lead	Pb	0.07			0.17	0.20				
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.04			0.10		0.06	0.03	0.03	0.07
Phosphorus	P	0.02	0.02			0.01		0.02	0.01	
Silicon	Si	0 01								
Cadmium	Cd									
Aluminum	Al	0.03	0.02		0 01	0.02		0.02	0.01	
Sulfur	S	0.04	0.11	0.03	0.02	0.02	0.01	0.04	0.02	0.01
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0 01	0.01		0.01	0.01		0.01	0.01	
Potassium	K									
Chlorine	Cl	0.01	0.03		0.01	0.02			0.01	
Platinum	Pt									
Zinc	Zn	0.04	0.03		0.02	0.03		0.04	0.03	0.01
Copper	Cu					0.03				0.03
Nickel	Ni									
Iron	Fe	0.58	0.39	0.04	0.25	0.25		0.24	0.14	0.02
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.03	0.04	0.02	0.02	0.04	0.02	0.04	0.02	0.02
Calcium	Ca	0.02	0.02	0.01	0.02	0.02		0.02	0.01	0.01

TABLE C-6. CAR 422 - TWELVE PERCENT IGNITION MISFIRE
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	422-11	422-12	422-13	422-21	422-22	422-23	422-31	422-32	422-33
Barometer, mm Hg	751.3	753.6	753.6	741.4	741.2	741.2	738.1	738.1	738.1
Humidity, g/kg	2.6	3.2	2.9	11.6	10.4	10.4	12.2	10.0	10.2
Temperature, °C	23.3	24.4	23.9	24.4	25.6	25.6	25.0	26.7	26.1
Total Fuel Sulfur, mg/km	23.76	17.32	14.43	24.87	20.66	18.44	21.99	18.27	16.98
Avg. Exh. Oxygen, %	1.51	0.96	0.37	1.76	1.03	0.46	1.01	0.33	0.13
Catalyst Avg. Temp., °C	411	538	611	541	683	--	--	577	711
Catalyst Max. Temp., °C	499	601	627	639	743	--	597	747	756
Carbon Dioxide, g/km	255.4	189.0	157.4	259.4	218.6	196.5	231.4	194.9	180.6
Fuel Cons., ℓ/100 km	11.08	8.08	6.73	11.61	9.64	8.60	10.26	8.53	7.92
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.15	0.01	0.07	1.12	0.26	0.15	0.98	0.24	0.17
Carbon Monoxide, g/km	2.42	0.20	0.07	5.70	4.03	2.94	3.71	2.64	2.80
Oxides of Nitrogen, g/km	0 59	0.31	0.25	0.35	0.11	0.06	0.39	0.08	0.03
Particulates									
Total Particulates	3.14	1.11	1.88	7.77	2.64	1.13	7.27	2.26	1.39
Sulfate	0.16	0.13	0.20	0.20	0.09	0.06	0.11	0.10	0.03
Sulfate as % of TFS, %	0.22	0.25	0.46	0.27	0.15	0.11	0.17	0.18	0.06
Compound Group Totals									
Aldehydes & Ketones	0.1	0.2	0.1	0.1	0.2	0.1	2.3	0.0	0.0
Individual Hydrocarbons	78.0	15.8	6.4	234.2	49.8	39.3	233.8	35.4	28.5
Organic Sulfides	0.27	0.02	0.03	--	--	--	--	--	--
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds									
Ammonia	--			51.51			21.90		
Cyanide & Cyanogen	0.70			6.85			1.33		
DMNA									
Hydrogen Sulfide	--	--	--	0.13	0.18	0.14	0.00	0.08	0.20
Nickel Carbonyl	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	19.78	3.97	1.64	11.09	1.46	1.68	10.74	0.89	0.78

TABLE C-6 (Cont'd). CAR 422 - TWELVE PERCENT IGNITION MISFIRE
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	422-11	422-12	422-13	422-21	422-22	422-23	422-31	422-32	422-33
Aldehydes and Ketones									
Formaldehyde	0.03	0.00	0.00	0.03	0.00	0.00	0.75	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	1.52	0.00	0.00
Acetone	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.18	0.14	0.00	0.18	0.14	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.1	0.2	0.1	0.1	0.2	0.1	2.3	0.0	0.0
Total as % of THC, %	0.1	2.0	0.1	0.1	2.0	0.1	0.2	0.0	0.0
Individual Hydrocarbons									
Methane	28.65	14.13	5.18	35.86	26.28	16.63	38.77	18.40	12.61
Ethylene	12.56	0.00	0.33	21.37	0.34	5.54	23.68	3.15	3.69
Ethane	3.83	1.52	0.88	7.01	6.99	4.40	4.71	4.68	3.22
Acetylene	7.08	0.00	0.00	14.02	0.00	0.00	23.26	0.00	0.00
Propane	1.65	0.06	0.00	1.74	1.25	0.64	0.98	0.70	0.00
Propylene	6.48	0.00	0.00	13.58	6.79	6.62	12.58	3.65	4.53
Benzene	6.80	0.05	0.00	42.59	5.81	2.63	36.18	4.83	3.47
Toluene	10.94	0.00	0.00	98.01	2.36	2.84	93.64	0.00	1.02
Total Individual HC	78.0	15.8	6.4	234.2	49.8	39.3	233.8	35.4	28.5
Total as % of THC, %	52.0	158.	9.1	20.9	19.2	26.2	23.9	14.8	16.8
Organic Sulfides									
Carbonyl Sulfide	0.18	0.01	0.01	--	--	--	--	--	--
Methyl Sulfide	0.02	0.01	0.02	--	--	--	--	--	--
Ethyl Sulfide	0.07	0.00	0.00	--	--	--	--	--	--
Methyl Disulfide	0.00	0.00	0.00	--	--	--	--	--	--
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-6(Cont'd). CAR 422 - TWELVE PERCENT IGNITION MISFIRE
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		422-11	422-12	422-13	422-21	422-22	422-23	422-31	422-32	422-33
Trace Elements										
Chromium	Cr									
Lead	Pb									
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.03	0.04		0.04	0.03	0.06	0.06	0.07	0.04
Phosphorus	P				0.01	0.01	0.01		0.01	
Silicon	Si				0.02	0.01				
Cadmium	Cd									
Aluminum	Al	0.01			0.05	0.02		0.01		
Sulfur	S	0.02	0.02	0.05	0.06	0.04	0.01	0.01	0.03	
Sodium	Na									
Fluorine	F				0.01	0.01		0.01	0.01	
Magnesium	Mg									
Potassium	K									
Chlorine	Cl				0.01	0.05			0.01	
Platinum	Pt									
Zinc	Zn	0.01	0.01		0.02	0.02	0.01	0.02	0.01	
Copper	Cu	0.01	0.02					0.02		
Nickel	Ni									
Iron	Fe	0.49	0.08	0.04	0.68	0.38	0.04	0.10	0.07	
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.02	0.01	0.04	0.02	0.02	0.02	0.02	0.01
Calcium	Ca	0.03	0.01		0.11	0.04		0.01	0.01	

TABLE C-7.CAR 423 - DISABLED EGR AND O_2
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	423-11	423-12	423-13	423-21	423-22	423-23	423-31	423-32	423-33
Barometer, mm Hg	745.2	744.7	744.7	736.9	735.6	735.6	738.1	737.9	737.9
Humidity, g/kg	10.8	18.3	18.3	13.0	12.3	10.3	3.4	3.1	2.7
Temperature, °C	26.1	27.8	27.8	26.7	26.7	27.8	24.4	25.0	26.1
Total Fuel Sulfur, mg/km	22.89	18.24	15.63	26.14	20.74	16.88	26.28	21.34	17.91
Avg. Exh. Oxygen, %	1.92	1.10	0.45	2.10	1.40	0.51	1.49	0.66	1.28
Catalyst Avg. Temp., °C	410	532	602	353	470	506	346	446	513
Catalyst Max. Temp., °C	499	618	636	423	525	542	423	533	550
Carbon Dioxide, g/km	245.0	198.0	170.2	191.9	154.2	122.1	191.4	160.8	136.7
Fuel Cons., ℓ/100 km	10.68	8.51	7.29	12.20	9.68	7.88	12.26	9.96	8.36
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.14	0.02	0.01	1.37	0.87	0.73	1.43	0.90	0.71
Carbon Monoxide, g/km	3.07	0.86	0.37	36.99	44.47	38.27	58.17	44.36	36.18
Oxides of Nitrogen, g/km	0.47	0.42	0.38	0.14	0.05	0.03	0.18	0.07	0.04
Particulates									
Total Particulates	9.37	3.61	1.60	31.10	16.38	21.53	26.25	19.19	11.77
Sulfate	0.48	0.13	0.10	0.15	0.02	0.15	0.09	0.10	0.06
Sulfate as % of TFS, %	0.70	0.24	0.21	0.19	0.03	0.30	0.11	0.16	0.11
Compound Group Totals									
Aldehydes & Ketones	--	--	--	6.4	3.3	0.4	6.4	3.4	3.7
Individual Hydrocarbons	81.1	18.0	15.6	678.3	470.5	381.4	703.5	483.1	377.5
Organic Sulfides	0.07	0.02	0.00	0.85	0.17	1.23	0.23	0.84	1.04
Organic Amines	0.00	0.01	0.02	0.02	0.03	0.00	0.02	0.02	0.04
Other Compounds									
Ammonia	8.61	--	--	110.78	--	--	77.06	--	--
Cyanide & Cyanogen	1.23	--	--	4.86	--	--	9.07	--	--
DMNA									
Hydrogen Sulfide	0.00	0.00	0.00	0.54	1.39	1.73	0.57	2.04	2.33
Nickel Carbonyl	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00
Nitrous Oxide	11.66	3.95	3.06	2.98	0.55	0.47	4.14	1.39	0.58

TABLE C-7 (Cont'd). CAR 423 - DISABLED EGR AND O_2
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	423-11	423-12	423-13	423-21	423-22	423-23	423-31	423-32	423-33
Aldehydes and Ketones									
Formaldehyde	--	--	--	1.23	0.34	0.31	2.12	0.70	1.04
Acetaldehyde	--	--	--	5.13	2.96	0.07	4.26	2.63	2.64
Acetone	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	--	--	--	6.4	3.3	0.4	6.4	3.4	3.7
Total as % of THC, %	--	--	--	0.5	0.4	0.1	0.4	0.4	0.5
Individual Hydrocarbons									
Methane	33.89	13.86	10.52	169.34	115.41	95.05	165.74	112.59	87.42
Ethylene	12.94	0.74	1.31	184.87	125.33	92.64	185.60	127.37	89.73
Ethane	4.11	1.87	1.48	13.95	11.12	9.68	15.69	12.37	10.21
Acetylene	5.36	0.00	0.75	20.49	0.26	0.15	29.47	0.00	0.00
Propane	1.26	0.00	0.34	1.63	1.19	0.90	1.38	1.10	0.84
Propylene	5.97	0.00	0.40	69.04	52.50	42.14	69.12	53.84	41.09
Benzene	7.11	1.52	0.84	88.83	70.44	62.82	106.83	86.47	75.34
Toluene	10.50	0.00	0.00	130.19	94.22	78.05	129.66	89.32	72.83
Total Individual HC	81.1	18.0	15.6	678.3	470.5	381.4	703.5	483.1	377.5
Total as % of THC, %	57.9	90.0	--	49.5	54.1	52.2	49.2	53.7	53.2
Organic Sulfides									
Carbonyl Sulfide	0.00	0.00	0.00	0.85	0.09	1.23	0.23	0.82	0.92
Methyl Sulfide	0.06	0.02	0.00	0.00	0.08	0.00	0.00	0.01	0.07
Ethyl Sulfide	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Organic Amines									
Monomethylamine	0.00	0.00	0.02	0.01	0.01	0.00	0.02	0.02	0.03
Monoethylamine	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-7(Cont'd). CAR 423 - DISABLED EGR AND O_2
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		423-11	423-12	423-13	423-21	423-22	423-23	423-31	423-32	423-33
Trace Elements										
Chromium	Cr									
Lead	Pb								0.01	
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br									
Phosphorus	P		0.02	0.01		0.01		0.01	0.04	0.01
Silicon	Si	0.02	0.01		0.04	0.02		0.01	0.04	
Cadmium	Cd									
Aluminum	Al	0.01	0.03		0.02	0.02		0.02	0.06	0.01
Sulfur	S	0.01	0.04	0.02	0.03	0.02	0.01	0.04	0.07	0.01
Sodium	Na								0.01	
Fluorine	F									
Magnesium	Mg		0.01		0.01	0.01		0.01	0.02	
Potassium	K				0.01	0.02				
Chlorine	Cl		0.01	0.01	0.01				0.03	0.01
Platinum	Pt									
Zinc	Zn		0.04			0.01		0.03	0.07	
Copper	Cu									
Nickel	Ni									
Iron	Fe	0.08	0.25		0.15	0.18	0.01	0.15	0.51	0.03
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.01	0.06	0.01	0.03	0.02	0.01	0.04	0.09	0.02
Calcium	Ca	0.09	0.09	0.01	0.16	0.11	0.01	0.04	0.16	0.01

TABLE C-8. CAR 424 - HIGH OIL CONSUMPTION
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	424-11	424-12	424-13	424-21	424-22	424-23	424-31	424-32	424-33
Barometer, mm Hg	754.6	755.4	754.4	743.2	743.2	743.2	744.7	741.9	744.7
Humidity, g/kg	2.3	3.1	2.9	11.8	9.0	7.2	7.6	7.7	8.2
Temperature, °C	22.8	23.3	23.9	23.9	23.9	25.0	21.1	23.9	21.1
Total Fuel Sulfur, mg/km	23.13	18.59	16.06	24.58	18.47	17.42	23.79	17.77	16.87
Avg. Exh. Oxygen, %	1.49	1.03	0.47	0.94	0.75	0.37	1.08	0.85	0.45
Catalyst Avg. Temp., °C	375.	506.	571.	--	495.	569.	372.	483.	576.
Catalyst Max. Temp., °C	492.	606.	610.	482.	584.	597.	474.	567.	601.
Carbon Dioxide, g/km	249.1	202.1	175.1	263.4	201.2	190.0	254.7	193.4	183.9
Fuel Cons., ℓ/100 km	10.79	8.67	7.50	11.47	8.62	8.13	11.10	8.29	7.87
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.15	0.02	0.02	0.23	0.03	0.02	0.25	0.03	0.01
Carbon Monoxide, g/km	2.09	0.62	0.27	2.95	0.43	0.26	2.94	0.50	0.34
Oxides of Nitrogen, g/km	0.60	0.41	0.46	0.57	0.47	0.50	0.59	0.48	0.55
Particulates									
Total Particulates	3.96	1.86	1.69	5.15	3.56	--	6.80	4.22	0.51
Sulfate	0.03	0.08	0.09	0.18	0.12	0.22	0.22	0.14	0.17
Sulfate as % of TFS, %	0.04	0.14	0.19	0.24	0.22	0.42	0.31	0.26	0.34
Compound Group Totals									
Aldehydes & Ketones	0.5	0.0	0.0	--	0.4	0.1	0.4	0.1	0.2
Individual Hydrocarbons	67.7	14.9	10.5	91.0	22.4	18.5	105.5	21.9	18.0
Organic Sulfides	0.03	0.00	0.00	0.19	0.04	0.09	0.09	0.02	0.04
Organic Amines	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00
Other Compounds									
Ammonia	8.21	--	--	3.67	--	--	6.94	--	--
Cyanide & Cyanogen	1.09	--	--	4.71	--	--	6.08	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
Nickel Carbonyl	0.00	0.00	0.00	--	--	--	--	--	--
Nitrous Oxide	33.3	6.2	3.6	23.9	6.4	3.5	31.1	5.5	3.3

TABLE C-8 (Cont'd). CAR 424 - HIGH OIL CONSUMPTION
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	424-11	424-12	424-13	424-21	424-22	424-23	424-31	424-32	424-33
Aldehydes and Ketones									
Formaldehyde	0.49	0.00	0.00	0.00	0.00	0.04	0.36	0.14	0.16
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Acetone	0.00	0.00	0.00	0.00	0.39	0.03	0.05	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde Hexanaldehyde Benzaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	0.5	0.0	0.0	--	0.4	0.1	0.4	0.1	0.2
Total as % of THC, %	0.3	0.0	0.0	--	1.3	0.5	0.2	0.3	2.0
Individual Hydrocarbons									
Methane	23.21	13.32	9.47	30.78	17.60	14.56	30.72	17.39	14.36
Ethylene	10.74	0.00	0.00	15.69	0.79	0.89	17.42	0.22	0.97
Ethane	3.41	1.59	1.03	5.07	2.79	2.02	5.51	2.47	2.00
Acetylene	4.24	0.00	0.00	5.71	0.00	0.00	6.86	0.00	0.00
Propane	1.36	0.00	0.00	0.00	0.00	0.00	6.49	0.44	0.00
Propylene	5.31	0.00	0.00	7.93	0.00	0.12	8.52	0.29	0.09
Benzene	6.91	0.00	0.00	9.70	0.84	0.68	10.36	0.83	0.60
Toluene	12.53	0.00	0.00	16.14	0.34	0.25	19.66	0.26	0.00
Total Individual HC	67.7	14.9	10.5	91.0	22.4	18.5	105.5	21.9	18.0
Total as % of THC, %	45.1	74.6	52.5	39.6	74.7	92.5	42.2	73.0	--
Organic Sulfides									
Carbonyl Sulfide	0.03	0.00	0.00	0.06	0.02	0.03	0.04	0.01	0.00
Methyl Sulfide	0.00	0.00	0.00	0.06	0.02	0.02	0.02	0.01	0.02
Ethyl Sulfide	0.00	0.00	0.00	0.06	0.00	0.03	0.03	0.00	0.02
Methyl Disulfide	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Monoethylamine	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-8 (Cont'd). CAR 424 - HIGH OIL CONSUMPTION
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		424-11	424-12	424-13	424-21	424-22	424-23	424-31	424-32	424-33
Trace Elements										
Chromium	Cr				No	No	No			
Lead	Pb				Data	Data	Data		0.13	
Manganese	Mn				for	for	for			
Arsenic	As				this	this	this			
Mercury	Hg				Test	Test	Test			
Bromine	Br									
Phosphorus	P	0.01	0.01					0.11	0.10	0.05
Silicon	Si	0.01		0.01				0.01	0.01	
Cadmium	Cd									
Aluminum	Al	0.01		0.01				0.01	0.01	
Sulfur	S	0.01	0.03	0.04				0.02	0.04	0.04
Sodium	Na							0.01	0.02	
Fluorine	F									
Magnesium	Mg	0.01						0.07	0.07	0.04
Potassium	K									
Chlorine	Cl		0.01	0.04				0.11	0.21	0.11
Platinum	Pt									
Zinc	Zn			0.01				0.10	0.11	0.03
Copper	Cu									
Nickel	Ni									
Iron	Fe	0.03		0.04				0.14	0.38	
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.01	0.01	0.02				0.22	0.22	0.13
Calcium	Ca	0.06	0.01	0.04				0.01	0.02	

TABLE C-9. CAR 431 - DISABLED OXYGEN SENSOR
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	431-11	431-12	431-13	431-21	431-22	431-23	431-31	431-32	431-33
Barometer, mm Hg	739.6	739.1	738.4	745.0	744.2	744.2	746.3	745.5	745.5
Humidity, g/kg	7.1	7.1	6.3	7.7	6.6	6.1	8.1	9.5	8.5
Temperature, °C	23.9	23.9	24.4	23.9	25.0	26.1	24.4	22.8	25.0
Total Fuel Sulfur, mg/km	23.75	20.02	18.18	24.36	22.06	20.19	25.33	21.96	20.44
Avg. Exh. Oxygen, %	--	--	--	0.20	0.10	0.01	0.72	0.40	0.06
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	256.7	217.2	196.3	229.7	192.5	176.6	246.3	209.1	188.4
Fuel Cons., ℓ/100 km	11.08	9.34	8.48	11.37	10.29	9.42	11.82	10.25	9.54
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.13	0.04	0.04	0.74	0.68	0.63	0.68	0.55	0.55
Carbon Monoxide, g/km	1.63	0.98	1.48	21.83	29.56	26.78	18.14	18.63	21.23
Oxides of Nitrogen, g/km	0.10	0.07	0.05	0.25	0.23	0.20	0.19	0.23	0.18
Particulates									
Total Particulates	2.17	0.25	0.26	12.32	2.82	1.89	5.38	0.82	1.11
Sulfate	0.19	0.11	0.08	0.10	0.09	0.07	0.17	0.10	0.06
Sulfate as % of TFS, %	0.27	0.18	0.15	0.14	0.14	0.12	0.22	0.15	0.10
Compound Group Totals									
Aldehydes & Ketones	0.0	0.0	0.0	0.8	0.6	1.0	0.0	0.0	0.0
Individual Hydrocarbons	55.6	24.0	29.8	412.9	392.6	372.6	395.1	349.4	351.7
Organic Sulfides	0.32	0.06	0.21	--	--	--	--	--	--
Organic Amines	0.00	0.00	0.00	0.05	0.07	0.02	0.02	0.03	0.04
Other Compounds									
Ammonia	28.11			245.59			275.32		
Cyanide & Cyanogen	0.58			70.04			63.78		
DMNA									
Hydrogen Sulfide	-	-	-	3.96	5.70	6.15	1.82	2.70	3.66
Nickel Carbonyl	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	12.68	5.44	3.82	14.04	3.98	4.81	32.15	12.67	5.36

TABLE C-9 (Cont'd). CAR 431 - DISABLED OXYGEN SENSOR
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	431-11	431-12	431-13	431-21	431-22	431-23	431-31	431-32	431-33
Aldehydes and Ketones									
Formaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.46	0.00	0.51	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.34	0.56	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.0	0.0	0.0	0.8	0.6	1.0	0.0	0.0	0.0
Total as % of THC, %	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0
Individual Hydrocarbons									
Methane	18.16	13.81	16.97	81.25	78.77	74.39	75.78	65.73	65.96
Ethylene	8.42	2.33	2.86	114.93	110.28	107.86	113.93	104.37	105.79
Ethane	2.56	2.38	2.76	15.26	13.81	13.83	15.44	13.97	13.78
Acetylene	2.88	0.00	0.00	2.27	0.52	0.38	2.11	0.10	0.56
Propane	1.66	0.82	0.17	0.99	1.31	0.99	0.60	0.83	0.99
Propylene	4.24	1.28	1.45	56.82	55.42	54.72	53.68	50.45	52.93
Benzene	6.91	2.85	3.91	60.15	57.64	52.29	59.70	52.33	49.01
Toluene	10.77	0.52	1.66	81.23	74.86	68.11	73.90	61.63	62.68
Total Individual HC	55.6	24.0	29.8	412.9	392.1	372.6	395.1	349.4	351.7
Total as % of THC, %	42.8	60.0	74.5	55.8	57.7	59.1	58.1	63.5	63.9
Organic Sulfides									
Carbonyl Sulfide	0.24	0.03	0.11	--	--	--	--	--	--
Methyl Sulfide	0.08	0.03	0.10	--	--	--	--	--	--
Ethyl Sulfide	0.00	0.00	0.00	--	--	--	--	--	--
Methyl Disulfide	0.00	0.00	0.00	--	--	--	--	--	--
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.04	0.06	0.01	0.02	0.02	0.03
Monoethylamine	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-9 (Cont'd). CAR 431 - DISABLED OXYGEN SENSOR
1978 SAAB 99 - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		431-11	431-12	431-13	431-21	431-22	431-23	431-31	431-32	431-33
Trace Elements										
Chromium	Cr									
Lead	Pb	0.13		0.14						
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.05	0.03		0.05		0.07		0.03	0.05
Phosphorus	P	0.01								
Silicon	Si	0.01	0.02		0.01	0.01			0.02	0.01
Cadmium	Cd									
Aluminum	Al	0.03	0.02	0.01	0.02	0.01			0.01	
Sulfur	S	0.02	0.02		0.03	0.02	0.02		0.02	0.01
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0.01	0.01						0.01	
Potassium	K									
Chlorine	Cl		0.01			0.01			0.01	
Platinum	Pt									
Zinc	Zn	0.01	0.01		0.01	0.01				
Copper	Cu	0.03								
Nickel	Ni									
Iron	Fe	0.36	0.16	0.07	0.34	0.17	0.08		0.13	0.07
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01
Calcium	Ca	0.01	0.02		0.02	0.01	0.01		0.02	0.01

No Data for this Test

TABLE C-10. CAR 432 - TWELVE PERCENT IGNITION MISFIRE
1978 SAAB 99 - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	432-11	432-12	432-13	432-21	432-22	432-23	432-31	432-32	432-33
Barometer,	mm Hg	757.2	756.9	755.6	758.7	755.9	755.1	739.1	745.0	745.0
Humidity,	g/kg	4.2	3.3	1.9	2.5	2.5	2.9	6.4	7.0	7.0
Temperature,	°C	20.6	22.8	26.1	22.2	22.2	23.9	25.6	25.6	25.6
Total Fuel Sulfur,	mg/km	22.19	19.95	19.28	27.49	23.42	20.93	28.11	23.13	20.01
Avg. Exh. Oxygen,	%	0.73	0.16	0.02	0.74	--	0.21	0.59	0.26	0.15
Catalyst Avg. Temp.,	°C	--	--	--	--	--	--	--	--	--
Catalyst Max. Temp.,	°C	--	--	--	--	--	--	--	--	--
Carbon Dioxide,	g/km	239.3	215.9	208.9	276.6	235.0	208.9	282.9	233.1	200.1
Fuel Cons.,	ℓ/100 km	10.35	9.31	9.00	12.83	10.93	9.77	13.12	10.79	9.34
Regulated Emissions										
Hydrocarbons, (THC),	g/km	0.10	0.03	0.02	2.21	1.66	1.50	2.09	1.54	1.38
Carbon Monoxide,	g/km	1.89	1.34	1.15	10.82	9.99	9.64	11.34	9.47	9.07
Oxides of Nitrogen,	g/km	0.10	0.08	0.07	0.09	0.07	0.06	0.08	0.06	0.05
Particulates										
Total Particulates		5.20	1.11	0.91	19.81	9.75	8.31	14.39	8.56	8.02
Sulfate		0.14	0.04	0.07	--	0.16	--	0.31	0.16	0.05
Sulfate as % of TFS,	%	0.21	0.07	0.12	--	0.23	--	0.37	0.23	0.08
Compound Group Totals										
Aldehydes & Ketones		0.0	0.0	0.0	0.0	6.2	1.7	0.0	2.2	0.0
Individual Hydrocarbons		105.1	25.0	28.3	473.4	470.4	478.3	471.5	454.7	463.5
Organic Sulfides		--	0.22	0.23	--	--	--	0.71	0.61	0.48
Organic Amines		0.02	0.00	0.09	0.00	0.01	0.02	0.02	0.00	0.03
Other Compounds										
Ammonia		54.09	--	--	154.63	--	--	130.41	--	--
Cyanide & Cyanogen		1.04	--	--	7.52	--	--	7.94	--	--
DMNA										
Hydrogen Sulfide		0.06	0.55	0.28	1.23	1.19	1.10	1.21	0.91	1.16
Nickel Carbonyl		0.00	0.00	0.00	0.00	0.00	0.00	--	--	--
Nitrous Oxide		10.59	7.33	2.53	2.94	1.33	0.85	2.85	0.70	0.49

TABLE C-10 (Cont'd). - TWELVE PERCENT IGNITION MISFIRE
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	432-11	432-12	432-13	432-21	432-22	432-23	432-31	432-32	432-33
Aldehydes and Ketones									
Formaldehyde	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.61	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	2.29	1.65	0.00	1.54	0.00
Acetone	0.00	0.00	0.00	0.00	3.33	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.0	0.0	0.0	0.0	6.2	1.7	0.0	2.2	0.0
Total as % of THC, %	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.1	0.0
Individual Hydrocarbons									
Methane	19.53	13.77	13.92	82.60	82.02	80.57	83.39	76.35	75.65
Ethylene	10.22	2.95	2.88	62.50	90.99	101.51	67.02	91.00	104.61
Ethane	3.26	2.39	2.13	19.38	25.60	26.59	20.93	24.88	25.89
Acetylene	4.15	0.00	0.00	2.93	0.52	1.34	3.15	1.04	1.48
Propane	0.00	0.00	0.23	2.78	2.54	2.53	1.94	2.41	2.36
Propylene	4.18	1.53	1.57	59.29	87.83	98.51	63.23	88.65	100.77
Benzene	55.06	3.35	3.76	101.79	70.77	67.67	97.01	67.52	60.18
Toluene	8.68	1.02	3.83	142.17	110.08	99.62	134.84	102.80	92.59
Total Individual HC	105.1	25.0	28.3	473.4	470.4	478.3	471.5	454.7	463.5
Total as % of THC, %	105.1	83.3	--	21.4	28.3	31.9	22.6	29.5	33.6
Organic Sulfides									
Carbonyl Sulfide	--	0.14	0.23	--	--	--	0.71	0.61	0.48
Methyl Sulfide	--	0.08	0.00	--	--	--	0.00	0.00	0.00
Ethyl Sulfide	--	0.00	0.00	--	--	--	0.00	0.00	0.00
Methyl Disulfide	--	0.00	0.00	--	--	--	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.05	0.00	0.01	0.01	0.01	0.00	0.02
Monoethylamine	0.01	0.00	0.04	0.00	0.00	0.01	0.01	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-10 (Cont'd). CAR 432 - TWELVE PERCENT IGNITION MISFIRE
1978 SAAB 99 - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		432-11	432-12	432-13	432-21	432-22	432-23	432-31	432-32	432-33
Trace Elements										
Chromium	Cr									
Lead	Pb				0.27	0.09		0.12	0.17	0.14
Manganese	Mn				0.01					
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.04	0.05				0.04			0.05
Phosphorus	P	0.01			0.03	0.01		0.01	0.01	0.01
Silicon	Si	0.03	0.02		0.07	0.04	0.03	0.08	0.02	0.07
Cadmium	Cd									
Aluminum	Al	0.15	0.01		0.23	0.06	0.05	0.11	0.04	0.05
Sulfur	S	0.07	0.01		0.18	0.07	0.03	0.10	0.09	0.03
Sodium	Na				0.02	0.01	0.02	0.01	0.01	
Fluorine	F									
Magnesium	Mg	0.01			0.01	0.01	0.01	0.02	0.01	0.02
Potassium	K									
Chlorine	Cl	0.04	0.01		0.03	0.01		0.01		0.01
Platinum	Pt									
Zinc	Zn	0.03	0.02		0.05	0.02	0.01	0.03	0.01	0.01
Copper	Cu						0.03		0.02	
Nickel	Ni									
Iron	Fe	0.72	0.09	0.03	4.12	0.88	0.56	1.29	0.58	0.50
Vanadium	V									
Titanium	Ti									0.01
Barium	Ba	0.02	0.01		0.06	0.02	0.01	0.03	0.02	0.02
Calcium	Ca	0.02	0.01		0.06	0.04	0.03	0.08	0.03	0.09

TABLE C-11. CAR 434 - HIGH OIL CONSUMPTION
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	434-11	434-12	434-13	434-21	434-22	434-23	434-31	434-32	434-33
Barometer, mm Hg	739.4	739.6	739.6	746.8	747.5	747.5	733.3	735.8	730.5
Humidity, g/kg	12.4	11.7	12.2	9.4	9.6	8.0	12.0	11.5	12.4
Temperature, °C	26.1	26.1	26.7	22.8	27.2	26.1	25.6	26.7	26.7
Total Fuel Sulfur, mg/km	22.93	20.39	18.10	25.52	21.09	19.82	25.00	21.64	19.69
Avg. Exh. Oxygen, %	1.51	0.85	1.26	0.85	0.46	--	0.72	0.39	0.10
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	247.0	220.7	195.0	274.6	228.1	214.5	269.7	234.3	212.0
Fuel Cons., ℓ/100 km	10.70	9.51	8.44	11.91	9.84	9.25	11.67	10.10	9.19
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.07	0.04	0.04	0.14	0.05	0.04	0.12	0.06	0.07
Carbon Monoxide, g/km	2.23	1.34	1.74	2.54	1.51	1.29	2.08	1.33	1.90
Oxides of Nitrogen, g/km	0.11	0.06	0.05	0.14	0.12	0.07	0.13	0.12	0.07
Particulates									
Total Particulates	----	----	----	7.51	5.14	1.11	5.35	3.38	1.06
Sulfate	0.28	0.14	0.06	0.08	0.11	0.06	0.13	0.12	0.08
Sulfate as % of TFS, %	0.41	0.23	0.11	0.10	0.17	0.10	0.17	0.18	0.14
Compound Group Totals									
Aldehydes & Ketones	0.0	0.0	0.5	0.3	0.2	0.2	0.8	0.2	0.9
Individual Hydrocarbons	61.7	25.5	31.5	72.7	35.0	34.1	----	----	40.6
Organic Sulfides	0.60	0.02	0.00	0.00	0.00	0.00	0.21	0.08	0.09
Organic Amines	0.01	0.00	0.02	0.01	0.02	0.05	0.01	0.06	0.02
Other Compounds									
Ammonia	75.12	----	----	112.18	----	----	61.91	----	----
Cyanide & Cyanogen	0.48	----	----	5.79	----	----	5.10	----	----
DMNA	----	----	----	----	----	----	----	----	----
Hydrogen Sulfide	0.15	0.38	0.60	0.22	0.38	0.59	0.05	0.24	0.43
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	8.36	2.77	2.85	9.67	4.19	2.77	8.09	5.35	2.82

TABLE C-11(Cont'd). CAR 434 - HIGH OIL CONSUMPTION
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	434-11	434-12	434-13	434-21	434-22	434-23	434-31	434-32	434-33
Aldehydes and Ketones									
Formaldehyde	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.04
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.21	0.73
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Isobutyraldehyde	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.07
Methyl Ethyl Ketone	0.00	0.00	0.00	0.27	0.20	0.24	0.21	0.00	0.00
Crotonaldehyde	----	----	----	----	----	----	----	----	----
Hexanaldehyde	0.00	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	----	----	----	----	----	----	----	----	----
Aldehydes and Ketones	0.0	0.0	0.5	0.3	0.2	0.2	0.8	0.2	0.9
Total as % of THC, %	0.0	0.0	1.3	0.2	0.4	0.5	0.7	0.3	1.3
Individual Hydrocarbons									
Methane	27.48	12.57	14.13	25.97	15.72	15.45	21.41	15.28	17.92
Ethylene	8.89	3.06	3.87	13.24	4.28	4.03	11.01	4.19	5.17
Ethane	3.02	1.74	2.02	3.72	2.51	2.39	3.37	2.45	3.05
Acetylene	1.40	0.16	0.00	2.28	0.54	0.24	2.18	0.53	0.37
Propane	0.79	0.06	0.05	0.32	0.26	0.03	----	----	0.40
Propylene	3.95	1.50	2.08	6.54	2.96	2.50	5.35	2.26	2.94
Benzene	7.21	4.77	5.35	8.73	4.80	5.04	7.41	4.73	6.12
Toluene	9.00	1.68	3.98	11.91	3.96	4.42	8.38	3.05	4.67
Total Individual HC	61.7	25.5	31.5	72.7	35.0	34.1	----	----	40.6
Total as % of THC, %	88.1	63.8	78.8	51.9	70.0	85.3	----	----	58.0
Organic Sulfides									
Carbonyl Sulfide	0.59	0.00	0.00	0.00	0.00	0.00	0.13	0.04	0.06
Methyl Sulfide	0.01	0.02	0.00	0.00	0.00	0.00	0.08	0.03	0.03
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.00	0.01	0.02	0.03	0.01	0.04	0.00
Monoethylamine	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.02	0.02
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-11 (Cont'd). CAR 434 - HIGH OIL CONSUMPTION
1978 SAAB 99 - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		434-11	434-12	434-13	434-21	434-22	434-23	434-31	434-32	434-33
Trace Elements										
Chromium	Cr									
Lead	Pb				0.10	0.10		0.14	0.14	
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
							0.05			0.05
Bromine	Br				0.17	0.20	0.08	0.12	0.13	0.11
Phosphorus	P		0.01					0.02	0.01	
Silicon	Si	0.02	0.02	0.01	0.02	0.01				
Cadmium	Cd									
Aluminum	Al	0.06	0.02	0.01	0.08	0.04		0.03	0.02	
Sulfur	S	0.05	0.05	0.02	0.06	0.05	0.01	0.04	0.04	0.03
Sodium	Na				0.03	0.05		0.02	0.02	0.02
Fluorine	F									
Magnesium	Mg				0.11	0.12	0.06	0.09	0.09	0.07
Potassium	K									
Chlorine	Cl	0.04	0.02	0.02	0.72	0.56	0.20	0.13	0.61	0.38
Platinum	Pt									
Zinc	Zn				0.19	0.23	0.05	0.10	0.11	0.06
Copper	Cu					0.02		0.03		
Nickel	Ni									
Iron	Fe	0.81	0.28	0.17	0.46	0.20	0.03	0.69	0.27	0.06
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.01	0.01	0.37	0.39	0.18	0.26	0.27	0.21
Calcium	Ca	0.02	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.03

TABLE C-I2. CAR 436 - DISABLED 02 SENSOR AND RICH BEST IDLE
1978 SABB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	436-11	436-12	436-13	436-21	436-22	436-23	436-31	436-32	436-33
Barometer, mm Hg	740.7	737.4	737.4	751.1	751.6	750.8	747.8	747.5	747.5
Humidity, g/kg	5.0	7.3	6.9	2.5	3.1	1.9	3.2	4.0	5.5
Temperature, °C	24.4	25.0	24.4	21.1	23.3	23.9	23.3	23.9	24.4
Total Fuel Sulfur, mg/km	23.92	21.46	18.81	24.77	22.90	20.17	23.94	22.11	19.25
Avg. Exh. Oxygen, %	--	0.08	0.01	--	0.31	0.05	1.08	0.69	0.16
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	257.1	232.3	202.7	220.5	201.0	177.0	214.3	194.9	169.5
Fuel Cons., ℓ/100 km	11.16	10.01	8.77	11.56	10.68	9.41	11.17	10.32	8.98
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.10	0.01	0.04	0.83	0.67	0.56	0.80	0.66	0.52
Carbon Monoxide, g/km	2.61	1.46	1.74	30.33	30.02	26.53	28.61	28.52	25.03
Oxides of Nitrogen, g/km	0.12	0.09	0.08	0.14	0.17	0.14	0.13	0.17	0.15
Particulates									
Total Particulates	7.34	11.00	15.20	14.32	0.70	1.21	10.17	3.20	4.68
Sulfate	0.13	0.11	0.05	0.24	0.12	0.00	0.11	0.15	0.08
Sulfate as % of TFS, %	0.18	0.17	0.09	0.32	0.17	0.00	0.15	0.23	0.14
Compound Group Totals									
Aldehydes & Ketones	1.5	0.0	0.3	3.7	0.7	0.0	1.9	0.0	0.0
Individual Hydrocarbons	66.7	32.9	30.8	414.0	345.0	318.3	415.7	355.9	313.5
Organic Sulfides	0.05	0.04	0.05	4.23	3.46	3.08	2.23	4.34	3.91
Organic Amines	0.01	0.02	0.02	0.03	0.05	0.04	0.05	0.03	0.03
Other Compounds									
Ammonia	85.85	--	--	315.58	--	--	320.54	--	--
Cyanide & Cyanogen	2.24	--	--	41.59	--	--	31.78	--	--
DMNA									
Hydrogen Sulfide	0.15	0.37	0.53	5.22	6.81	6.30	5.95	6.75	6.52
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	12.39	4.40	4.50	10.44	5.11	4.05	9.51	3.66	2.91

TABLE C-12 (Cont'd). CAR 436 - DISABLED 02 SENSOR AND RICH BEST IDLE
1978 SAAB 99 - THREE-WAY CATALYST

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	436-11	436-12	436-13	436-21	436-22	436-23	436-31	436-32	436-33
Aldehydes and Ketones									
Formaldehyde	0.34	0.00	0.27	0.54	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	1.17	0.00	0.00	3.16	0.69	0.00	1.78	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	1.5	0.0	0.3	3.7	0.7	0.0	1.9	0.0	0.0
Total as % of THC, %	1.5	0.0	0.8	0.4	0.1	0.0	0.2	0.0	0.0
Individual Hydrocarbons									
Methane	17.92	11.92	11.27	94.90	58.12	67.05	91.45	73.23	65.93
Ethylene	10.48	4.51	5.07	115.21	103.95	92.13	110.84	97.62	86.27
Ethane	3.54	2.27	2.26	13.06	12.67	11.86	13.17	12.20	11.16
Acetylene	1.83	0.00	0.00	2.03	1.07	0.76	1.90	0.53	0.58
Propane	3.77	1.10	0.35	1.48	1.09	0.83	1.72	1.20	1.14
Propylene	4.73	2.39	2.47	51.55	51.16	45.56	51.88	48.51	43.29
Benzene	9.95	5.54	5.62	51.44	45.44	39.22	49.62	43.47	38.02
Toluene	14.51	5.12	3.71	84.37	71.53	60.88	84.55	69.90	58.98
Total Individual HC	66.7	32.9	30.8	414.0	345.0	318.3	405.1	346.7	305.4
Total as % of THC, %	66.7	--	77.0	49.9	51.5	56.8	50.6	52.5	58.7
Organic Sulfides									
Carbonyl Sulfide	0.04	0.00	0.04	4.01	3.22	2.99	2.17	4.07	3.90
Methyl Sulfide	0.01	0.03	0.01	0.11	0.11	0.02	0.03	0.23	0.00
Ethyl Sulfide	0.00	0.01	0.00	0.11	0.13	0.07	0.03	0.04	0.01
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.02	0.01	0.02	0.04	0.04	0.04	0.03	0.03
Monoethylamine	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-12 (Cont'd). CAR 436 - DISABLED O_2 SENSOR AND RICH BEST IDLE
1978 SAAB 99 - THREE-WAY CATALYST

		EMISSION RATE, MG/KM (Except at Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		436-11	436-12	436-13	436-21	436-22	436-23	436-31	436-32	436-33
Trace Elements										
Chromium	Cr									
Lead	Pb									
Manganese	Mn	0.01								
Arsenic	As									
Mercury	Hg									
Bromine	Br									
Phosphorus	P	0.04	0.01		0.01	0.01				
Silicon	Si	0.06	0.02	0.04	0.02	0.01		0.01	0.01	
Cadmium	Cd									
Aluminum	Al	0.09	0.02	0.01	0.06	0.02	0.01	0.01	0.01	
Sulfur	S	0.06	0.04	0.02	0.07	0.03	0.02	0.02	0.05	0.01
Sodium	Na	0.01			0.01					
Fluorine	F									
Magnesium	Mg	0.02	0.01			0.01				
Potassium	K	0.01		0.01				0.01		
Chlorine	Cl	0.07	0.18	0.02	0.01	0.01	0.01	0.01	0.01	
Platinum	Pt									
Zinc	Zn	0.07	0.01	0 01	0.01	0.01				
Copper	Cu									
Nickel	Ni									
Iron	Fe	0.67	0.18	0.08	0.64	0.19	0.12	0.15	0.11	0.06
Vanadium	V									
Titanium	Ti	0.01								
Barium	Ba	0.07	0.02	0.02	0.02	0.01		0.01	0.01	
Calcium	Ca	0.06	0.02	0.02	0.03	0.01	0.01	0.02	0.01	0.01

APPENDIX D

FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

TABLE D-1. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 411 - Disabled Oxygen Sensor

Emissions in mg/km

	Unmodified 411-11		Malfunction 411-21		411-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	20.06	5.63	4.35	2.49	1.88	2.89
Sulfates	6.78	0.19	1.35	0.44	0.92	1.47
Ammonia	--	--	16.06	12.59	7.52	--
Cyanides & Cyanogen	--	--	--	--	--	--
Hydrogen Sulfide	0.09	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	0.00	5.50	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.08	0.00
Acetone	0.14	0.14	0.00	0.00	0.57	0.04
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.25	0.24	0.18	0.28	0.15	0.26
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.35	0.34	0.32	0.19	0.19	0.32
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.656	0.557	--	0.09	0.18	0.06
Methyl sulfide	0.00	0.096	--	0.05	0.03	0.02
Ethyl sulfide	0.00	0.00	--	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	--	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.04	0.02	0.00	0.01	0.00	0.03
Monoethylamine & dimethylamine	0.08	0.05	0.00	0.00	0.00	0.00
Trimethylamine	0.04	0.00	0.00	0.05	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	--	--	--	--	8.81	5.74	8.97	5.36	7.35	3.10	6.66	4.06
Ethylene	--	--	--	--	1.58	0.24	0.66	0.08	1.15	0.00	0.19	0.03
Ethane	--	--	--	--	0.40	0.73	0.44	0.70	0.54	0.37	0.85	0.43
Acetylene	--	--	--	--	0.98	0.02	0.00	0.00	0.54	0.00	0.00	0.00
Propane	--	--	--	--	0.39	0.36	0.33	0.30	0.00	0.00	0.00	0.00
Propylene	--	--	--	--	0.72	0.00	0.22	0.00	0.45	0.00	0.00	0.00
Benzene	--	--	--	--	1.91	0.04	0.77	0.04	1.59	0.07	0.21	0.07
Toluene	--	--	--	--	1.98	0.00	0.30	0.00	1.88	0.00	0.00	0.00
Other												
Nitrous Oxide	0.07	0.02	0.22	0.04	0.31	0.21	1.30	0.19	0.36	0.36	1.08	0.33
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-2. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series No. 412 - Twelve Percent Misfire

Emissions in mg/km

	Unmodified 412-11		Malfunction 412-21		412-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	22.75	2.26	9.06	2.91	13.07	3.31
Sulfates	10.44	0.22	0.73	0.41	1.10	1.00
Ammonia	7.96	2.83	5.51	7.30	--	0.74
Cyanides & Cyanogen	0.00	0.00	0.03	0.11	0.00	0.20
Hydrogen Sulfide	--	--	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.07	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.07	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	1.77	0.02	0.36	0.05	0.17	0.05
Methyl sulfide	0.58	0.00	0.01	0.03	0.03	0.01
Ethyl sulfide	0.00	0.00	0.09	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	7.43	2.73	2.44	1.79	7.14	0.82	2.53	0.88	6.00	0.26	2.09	0.50
Ethylene	1.80	0.00	0.00	0.00	4.25	0.15	0.21	0.19	3.62	0.00	0.00	0.00
Ethane	0.29	0.14	0.43	0.21	0.52	0.17	0.27	0.15	0.53	0.10	0.28	0.10
Acetylene	1.58	0.00	0.00	0.00	2.97	0.00	0.00	0.00	2.44	0.00	0.00	0.00
Propane	0.01	0.00	0.01	0.01	0.27	0.01	0.14	0.02	0.15	0.00	0.09	0.00
Propylene	0.67	0.00	0.00	0.00	1.72	0.00	0.00	0.02	1.64	0.00	0.00	0.00
Benzene	2.31	0.00	0.03	0.01	9.88	0.46	0.30	0.01	8.82	0.00	0.27	0.00
Toluene	2.13	0.01	0.05	0.03	21.91	0.63	0.02	0.00	19.25	0.38	0.21	0.00
Other												
Nitrous Oxide	0.27	0.38	1.37	0.37	0.47	0.09	0.54	0.55	0.54	0.06	0.56	0.14
Nickel Carbonyl	--	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-3. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 413 - Disabled EGR & O_2

Emissions in mg/km

	Unmodified 413-11		Malfunction 413-21		413-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	64.24	4.23	52.08	22.11	6.27	3.11
Sulfates	3.96	0.15	45.85	1.78	2.57	2.39
Ammonia	10.79	8.22	14.97	17.36	10.81	9.58
Cyanides & Cyanogen	0.00	0.00	0.1	0.00	0.00	0.00
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	0.00	0.00	0.00	0.00	2.22	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	--	--	0.09	0.00	0.00	0.00
Methyl sulfide	--	--	0.18	0.14	0.00	0.18
Ethyl sulfide	--	--	0.07	0.00	0.00	0.00
Methyl disulfide	--	--	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	4.72	0.89	1.88	0.76	8.18	5.41	7.76	5.11	7.91	4.64	7.66	5.04
Ethylene	1.50	0.28	0.15	0.11	1.18	0.04	0.28	0.01	0.89	0.12	0.28	0.01
Ethane	0.29	0.08	0.34	0.01	0.49	0.53	0.86	0.52	0.57	0.51	0.96	0.51
Acetylene	1.24	0.12	0.02	0.00	0.60	0.00	0.00	0.00	0.48	0.06	0.00	0.00
Propane	0.00	0.00	0.00	0.00	0.09	0.01	0.03	0.00	0.00	0.00	0.00	0.00
Propylene	0.63	0.00	0.00	0.00	0.53	0.00	0.02	0.00	0.42	0.00	0.02	0.00
Benzene	1.52	0.00	0.00	0.00	1.79	0.22	0.55	0.02	1.19	0.05	0.46	0.08
Toluene	1.64	0.00	0.00	0.00	2.08	0.09	0.24	0.01	1.21	0.00	0.00	0.00
Other												
Nitrous Oxide	0.49	0.30	1.19	0.24	1.46	2.40	2.39	2.10	1.67	2.74	3.78	1.85
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-4. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 415 - Disabled Air & O_2

Emissions in mg/km

	Unmodified 415-11		Malfunction 415-21		415-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	15.59	2.61	14.88	7.58	6.88	2.37
Sulfates	7.03	0.15	0.10	0.05	0.05	0.01
Ammonia	4.12	3.39	7.46	42.40	90.85	105.39
Cyanides & Cyanogen	0.02	0.23	12.53	14.88	6.34	6.46
Hydrogen Sulfide	0.00	0.00	0.88	1.22	0.42	0.42
Aldehydes & Ketones						
Formaldehyde	0.01	0.01	1.27	0.00	0.11	0.06
Acetaldehyde	0.00	0.00	0.48	0.13	2.02	0.15
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.41	0.00
Methyl ethyl ketone	0.21	0.30	0.45	0.23	0.16	0.07
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	1.63	0.00	1.00	1.54	0.02	0.08
Methyl sulfide	0.00	0.00	0.07	0.21	0.00	0.00
Ethyl sulfide	0.00	0.00	0.02	0.01	0.21	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.01	0.01
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.01	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	3.60	1.65	3.12	1.84	20.08	6.29	10.56	6.02	18.81	4.67	9.56	5.08
Ethylene	0.89	0.00	0.30	0.00	22.89	13.18	18.49	12.62	22.41	7.83	14.26	6.32
Ethane	0.15	0.03	0.37	0.11	2.18	1.21	2.93	1.21	2.29	1.07	1.86	1.02
Acetylene	0.26	0.00	0.00	0.00	6.35	0.00	0.00	0.00	2.84	0.11	0.08	0.05
Propane	0.05	0.00	0.02	0.00	0.28	0.19	0.31	0.17	0.24	0.13	0.19	0.11
Propylene	0.42	0.00	0.00	0.00	8.91	5.33	7.96	5.30	8.05	3.31	6.18	2.59
Benzene	0.84	0.00	0.26	0.00	16.31	5.88	8.27	5.35	12.09	7.19	9.69	6.78
Toluene	0.97	0.00	0.00	0.00	20.51	9.69	16.00	9.94	18.44	6.67	11.51	5.96
Other												
Nitrous Oxide	0.30	0.19	0.95	0.21	0.09	0.08	0.09	0.02	0.65	0.34	0.46	0.23
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-5. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 421 - Disabled Oxygen Sensor

Emissions in mg/km

	Unmodified 421-11		Malfunction 421-21		Malfunction 421-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	7.55	4.39	12.17	8.51	7.86	15.33
Sulfates	0.14	0.15	0.43	0.27	0.40	0.22
Ammonia	25.97	9.26	70.12	77.34	59.51	63.79
Cyanides & Cyanogen	-----	-----	4.84	3.13	5.11	3.85
Hydrogen Sulfide	0.07	0.07	0.79	0.97	1.07	1.33
Aldehydes & Ketones						
Formaldehyde	1.09	0.13	2.03	0.51	0.54	0.16
Acetaldehyde	0.15	0.21	1.79	3.02	2.43	0.83
Acetone	0.00	0.00	0.42	0.60	0.64	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.16	0.37	0.32	0.31	0.30	0.14
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.33	0.33	0.40	0.40	0.35	0.28
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.53	0.15	2.03	1.27	1.14	0.95
Methyl sulfide	0.14	0.11	0.06	0.03	0.05	0.03
Ethyl sulfide	0.00	0.00	0.03	0.03	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.01	0.01	0.01	0.02	0.02	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	9.20	1.70	2.93	1.47	23.29	11.23	15.57	10.68	28.99	19.12	17.96	13.11
Ethylene	8.07	0.09	0.22	0.01	28.08	17.87	23.69	16.66	29.80	22.94	25.44	18.03
Ethane	1.14	0.23	0.54	0.24	2.15	1.29	1.81	1.16	2.39	1.67	1.97	1.45
Acetylene	5.72	0.00	0.00	0.00	7.54	0.00	0.15	0.00	9.35	0.00	0.25	0.00
Propane	0.22	0.11	0.10	0.00	0.28	0.18	0.10	0.17	0.26	0.15	0.22	0.20
Propylene	4.06	0.00	0.07	0.00	11.15	6.45	9.33	6.18	11.16	7.99	9.36	6.30
Benzene	7.01	0.00	0.75	0.00	20.11	11.72	13.11	9.42	20.18	10.42	14.28	10.05
Toluene	9.14	0.00	0.00	0.00	23.35	13.89	15.85	11.72	24.79	13.49	16.95	11.61
Other												
Nitrous Oxide	0.80	0.00	0.13	0.01	0.21	0.07	0.15	0.08	0.13	0.02	0.03	0.04
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-6. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series No. 422 - Twelve Percent Misfire

Emissions in mg/km

	Unmodified 422-11		Malfunction 422-21		422-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	3.57	2.81	12.34	4.33	9.77	5.39
Sulfates	0.19	0.14	0.31	0.12	0.14	0.09
Ammonia	----	----	78.98	30.78	26.47	18.45
Cyanides & Cyanogen	1.40	0.18	13.68	1.69	2.41	0.51
Hydrogen Sulfide	--	--	0.18	0.09	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	0.00	0.05	1.75	0.00	1.08	0.00
Acetaldehyde	0.00	0.00	3.53	0.00	0.00	0.00
Acetone	0.10	0.09	0.00	0.00	0.97	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.38
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.34	0.06	--	--	--	--
Methyl sulfide	0.01	0.03	--	--	--	--
Ethyl sulfide	0.16	0.00	--	--	--	--
Methyl disulfide	0.00	0.00	--	--	--	--
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.01	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	6.86	1.14	2.72	0.88	12.82	0.12	2.92	0.54	14.50	0.83	2.45	0.50
Ethylene	7.50	0.05	0.16	0.00	12.28	0.16	0.43	0.10	13.05	0.41	0.43	0.24
Ethane	0.96	0.17	0.50	0.14	2.26	0.15	0.81	0.20	1.64	0.14	0.46	0.13
Acetylene	4.73	0.00	0.00	0.00	9.41	0.00	0.00	0.00	15.06	0.38	0.00	0.00
Propane	0.22	0.13	0.13	0.16	0.42	0.10	0.18	0.08	0.41	0.00	0.13	0.00
Propylene	4.01	0.00	0.00	0.00	7.87	0.06	0.32	0.03	7.68	0.00	0.15	0.00
Benzene	5.12	0.05	0.24	0.00	27.45	1.40	2.76	0.50	25.81	0.75	1.62	0.19
Toluene	6.76	0.08	0.28	0.00	54.98	3.26	3.20	0.11	54.31	3.21	2.12	0.00
Other												
Nitrous Oxide	1.48	0.22	1.01	0.09	1.62	0.03	0.23	0.03	1.80	0.00	0.17	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-7. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

Test Series 423 - Disabled EGR & O_2

Emissions in mg/km

	Unmodified 423-11		Malfunction 423-21		423-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	8.26	10.21	35.35	27.90	33.69	20.63
Sulfates	1.02	0.08	0.24	0.08	0.14	0.05
Ammonia	8.41	8.76	93.13	124.09	70.20	82.24
Cyanides & Cyanogen	2.20	0.50	5.95	4.04	10.20	8.22
Hydrogen Sulfide	0.00	0.00	0.57	0.51	0.93	0.10
Aldehydes & Ketones						
Formaldehyde	--	--	1.95	0.68	2.82	1.59
Acetaldehyde	--	--	5.41	4.92	4.92	3.77
Acetone	--	--	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	0.00	0.00	0.00	0.00
Methyl ethyl ketone	--	--	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	---	--	--
Hexanaldehyde	--	--	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	---	--	--
Organic Sulfides						
Carbonyl sulfide	0.00	0.00	1.24	0.56	0.22	0.23
Methyl sulfide	0.00	0.10	0.00	0.00	0.00	0.00
Ethyl sulfide	0.00	0.02	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.01	0.01	0.01	0.02
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.01	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	7.02	1.46	2.93	1.58	29.31	10.67	16.91	9.83	29.47	10.84	14.56	10.54
Ethylene	7.20	0.16	0.19	0.15	29.49	15.10	22.10	14.31	28.55	15.47	21.05	15.47
Ethane	0.98	0.19	0.49	0.19	2.07	0.95	1.63	1.05	2.45	1.10	1.64	1.23
Acetylene	3.53	0.02	0.01	0.01	13.76	0.03	0.20	0.00	19.23	0.00	0.79	0.00
Propane	0.15	0.12	0.11	0.09	0.25	0.13	0.17	0.12	0.29	0.13	0.24	0.00
Propylene	3.71	0.00	0.00	0.00	10.72	5.45	8.70	5.37	10.63	5.57	8.18	5.71
Benzene	4.53	0.00	0.18	0.00	16.32	7.88	10.69	7.29	19.97	9.36	11.84	9.44
Toluene	7.05	0.00	0.02	0.00	22.97	11.53	15.18	11.04	23.32	11.16	14.74	11.35
Other												
Nitrous Oxide	1.24	0.06	0.51	0.06	0 09	0.10	0.06	0.03	0.12	0.17	0.07	0.07
Nickel Carbonyl	0.00	0.00	0.00	0.00	-----	-----	-----	-----	0.00	0.00	0.00	0.00

TABLE D-8. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 424 - High Oil Consumption

Emissions in mg/km

	Unmodified 424-11		Malfunction 424-21		424-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	7.72	1.13	7.41	3.44	11.16	3.51
Sulfates	0.05	0.02	0.21	0.16	0.35	0.13
Ammonia	9.13	7.51	3.73	3.63	6.14	7.55
Cyanides & Cyanogen	1.71	0.63	6.64	3.26	10.70	2.60
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.14	0.00
Aldehydes & Ketones						
Formaldehyde	1.13	0.00	0.00	0.00	0.57	0.21
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.09
Isobutyraldehyde	0.00	0.00	0.00	----	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	----	----	----	----	----	----
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	----	----	----	----	----	----
Organic Sulfides						
Carbonyl sulfide	0.08	0.00	0.04	0.08	0.02	0.06
Methyl sulfide	0.01	0.00	0.03	0.08	0.00	0.03
Ethyl sulfide	0.01	0.00	0.14	0.00	0.06	0.00
Methyl disulfide	0.00	0.00	0.02	0.00	0.01	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.01	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.01	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	5.43	0.85	2.22	0.82	7.08	1.00	3.42	1.09	8.12	0.87	2.94	1.01
Ethylene	6.47	0.00	0.13	0.00	9.10	0.01	0.49	0.02	10.43	0.02	0.33	0.01
Ethane	0.78	0.15	0.47	0.14	1.20	0.21	0.69	0.22	1.44	0.24	0.68	0.20
Acetylene	2.84	0.00	0.00	0.00	3.83	0.00	0.00	0.00	4.62	0.00	0.00	0.00
Propane	0.15	0.09	0.13	0.15	0.00	0.00	0.00	0.00	0.79	1.01	0.48	0.31
Propylene	3.30	0.00	0.00	0.00	4.85	0.00	0.07	0.00	5.34	0.00	0.01	0.00
Benzene	4.12	0.00	0.38	0.00	5.81	0.04	0.50	0.00	6.54	0.01	0.33	0.00
Toluene	8.01	0.16	0.00	0.00	10.67	0.00	0.16	0.00	12.70	0.10	0.20	0.00
Other												
Nitrous Oxide	3.86	0.27	1.28	0.17	2.70	0.32	0.78	0.15	1.60	0.08	1.02	0.15
Nickel Carbonyl	0.00	0.00	0.00	0.00	----	----	----	----	----	----	----	----

TABLE D-9. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 431 - Disabled Oxygen Sensor

Emissions in mg/km

	Unmodified 431-11		Malfunction 431-21		431-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	3.24	1.36	20.70	6.00	7.37	3.87
Sulfates	0.28	0.13	0.13	0.08	0.21	0.14
Ammonia	30.65	26.20	227.66	259.12	269.57	279.89
Cyanides & Cyanogen	0.78	0.43	74.31	66.82	58.76	67.56
Hydrogen Sulfide	--	--	2.78	4.85	1.57	2.00
Aldehydes & Ketones						
Formaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.80	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.79	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	0.16	0.30	--	--	--	--
Methyl sulfide	0.09	0.07	--	--	--	--
Ethyl sulfide	0.01	0.00	--	--	--	--
Methyl disulfide	0.00	0.00	--	--	--	--
Organic Amines						
Monomethylamine	0.01	0.00	0.04	0.04	0.02	0.02
Monoethylamine & dimethylamine	0.00	0.00	0.01	0.01	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	5.36	0.36	1.94	0.11	10.41	4.53	8.83	5.95	10.58	4.49	7.95	4.75
Ethylene	3.97	0.03	0.94	0.02	13.28	8.62	15.36	10.59	14.66	8.50	14.66	9.57
Ethane	0.84	0.03	0.41	0.03	2.09	1.08	1.89	1.12	2.13	1.02	1.85	1.12
Acetylene	1.94	0.00	0.00	0.00	1.46	0.00	0.05	0.00	1.29	0.01	0.08	0.00
Propane	0.20	0.00	0.16	0.15	0.14	0.10	0.14	0.05	0.11	0.06	0.08	0.00
Propylene	2.06	0.00	0.47	0.00	6.09	4.37	7.79	5.25	6.71	4.39	7.19	5.01
Benzene	3.53	0.24	1.32	0.00	11.17	5.95	10.28	6.43	11.15	5.71	10.48	5.84
Toluene	4.77	0.24	1.55	0.00	10.11	6.79	11.49	7.74	10.09	5.84	10.14	6.47
Other												
Nitrous Oxide	0.73	0.04	0.93	0.16	0.82	0.41	0.47	0.21	1.02	0.85	1.49	0.74
Nickel Carbonyl	--	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-10. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 432 - Twelve Percent Misfire

Emissions in mg/km

	Unmodified 432-11		Malfunction 432-21		432-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	8.80	2.48	28.45	13.29	16.45	12.84
Sulfates	0.24	0.06	--	--	0.50	0.16
Ammonia	64.52	46.22	147.50	160.00	120.17	138.13
Cyanides & Cyanogen	1.23	0.89	8.35	6.90	8.31	7.66
Hydrogen Sulfide	0.14	0.00	0.91	1.48	0.90	1.44
Aldehydes & Ketones						
Formaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--	--
Organic Sulfides						
Carbonyl sulfide	--	--	--	--	0.88	0.59
Methyl sulfide	--	--	--	--	0.00	0.00
Ethyl sulfide	--	--	--	--	0.00	0.00
Methyl disulfide	--	--	--	--	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.01	0.00	0.00	0.00	0.02
Monoethylamine & dimethylamine	0.00	0.01	0.00	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	5.03	0.90	2.00	0.05	14.30	3.96	10.54	3.85	15.32	4.11	10.49	4.00
Ethylene	3.59	0.55	1.15	0.14	17.71	1.82	10.73	1.69	18.69	2.42	11.63	2.07
Ethane	0.76	0.19	0.41	0.11	4.23	0.77	2.95	0.78	4.55	0.95	3.25	0.89
Acetylene	1.89	0.45	0.08	0.00	1.83	0.00	0.10	0.00	1.96	0.00	0.15	0.00
Propane	0.00	0.00	0.00	0.00	0.47	0.19	0.35	0.17	0.26	0.10	0.29	0.13
Propylene	1.72	0.10	0.54	0.00	15.37	2.03	10.23	1.99	15.86	2.70	11.10	2.35
Benzene	3.26	0.22	1.27	0.01	22.19	9.42	18.39	8.89	17.44	6.52	15.11	7.98
Toluene	4.18	0.14	1.03	0.00	33.78	9.25	18.43	8.93	31.48	8.73	19.60	8.56
Other												
Nitrous Oxide	0.35	0.06	0.95	0.06	0.28	0.01	0.09	0.00	0.31	0.03	0.07	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----	----	-----	----

TABLE D-11. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 434 - High Oil Consumption

Emissions in mg/km

	Unmodified 434-11		Malfunction 434-21		434-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate			11.36	4.60	9.24	2.41
Sulfates	0.49	0.13	0.17	0.01	0.14	0.13
Ammonia	75.06	75.17	71.70	142.71	57.61	65.01
Cyanides & Cyanogen	1.02	0.07	6.61	5.17	6.13	4.32
Hydrogen Sulfide	0.34	0.00	0.45	0.22	0.07	0.03
Aldehydes & Ketones						
Formaldehyde	0.00	0.00	0.00	0.03	0.00	0.00
Acetaldehyde	0.00	0.00	0.00	0.00	0.49	0.64
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.10	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.15	0.36	0.21	0.21
Crotonaldehyde	----	----	----	----	----	----
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	----	----	----	----	----	----
Organic Sulfides						
Carbonyl sulfide	0.12	0.94	0.00	0.00	0.10	0.15
Methyl sulfide	0.03	0.00	0.00	0.00	0.03	0.11
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.01	0.00	0.02	0.01	0.01
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	5.98	1.21	3.16	0.95	6.81	0.59	2.82	0.56	5.99	0.32	2.43	0.14
Ethylene	3.81	0.20	0.89	0.14	5.28	0.21	1.58	0.19	5.11	0.23	0.86	0.12
Ethane	0.81	0.12	0.44	0.09	1.09	0.03	0.49	0.10	1.00	0.12	0.48	0.05
Acetylene	0.89	0.02	0.01	0.01	1.18	0.08	0.08	0.03	1.14	0.05	0.10	0.05
Propane	0.21	0.05	0.02	0.07	0.09	0.05	0.00	0.00	3.69	2.65	2.02	1.30
Propylene	1.84	0.02	0.45	0.03	2.70	0.05	0.83	0.05	2.51	0.05	0.49	0.05
Benzene	3.08	0.12	1.19	0.03	3.56	0.09	1.45	0.06	3.30	0.07	1.18	0.00
Toluene	4.31	0.08	1.25	0.00	5.62	0.00	1.76	0.00	4.76	0.00	0.99	0.00
Other												
Nitrous Oxide	0.53	0.30	0.34	0.03	0.53	0.09	0.61	0.11	0.54	0.07	0.45	0.08
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE D-12. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 436 - Disabled O_2 + R.B.I.

Emissions in mg/km

	Unmodified 436-11		Malfunction 436-21		436-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	15.36	1.29	20.72	9.50	13.02	8.02
Sulfates	0.20	0.07	0.41	0.12	0.14	0.08
Ammonia	97.60	76.98	305.14	323.46	300.77	335.45
Cyanides & Cyanogen	2.44	2.09	34.46	46.97	38.18	26.95
Hydrogen Sulfide	0.18	0.13	4.34	5.89	5.03	6.65
Aldehydes & Ketones						
Formaldehyde	0.38	0.31	0.00	0.95	0.00	0.00
Acetaldehyde	2.72	0.00	2.76	3.47	0.00	3.13
Acetone	0.00	0.00	0.00	0.00	0.00	0.27
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	-----	-----	-----	-----	-----	-----
Hexanaldehyde	-	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	-----	-----	-----	-----	-----	-----
Organic Sulfides						
Carbonyl sulfide	0.09	0.00	4.12	3.92	0.38	3.52
Methyl sulfide	0.02	0.00	0.02	0.18	0.04	0.02
Ethyl sulfide	0.01	0.00	0.12	0.10	0.01	0.04
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.01	0.04	0.01	0.03	0.05
Monoethylamine & dimethylamine	0.00	0.00	0.02	0.01	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	5.39	0.14	1.99	0.02	13.11	6.20	8.97	6.60	11.94	6.18	9.04	6.39
Ethylene	4.26	0.26	1.14	0.19	13.35	9.63	13.82	10.49	14.32	8.79	13.63	9.70
Ethane	0.87	0.17	0.47	0.13	1.97	0.87	1.57	0.91	1.96	0.92	1.60	0.91
Acetylene	1.24	0.00	0.00	0.00	1.21	0.00	0.10	0.00	1.25	0.00	0.04	0.00
Propane	0.52	0.37	0.32	0.26	0.18	0.13	0.16	0.11	0.18	0.18	0.20	0.12
Propylene	2.14	0.00	0.65	0.00	5.66	4.32	6.32	4.75	6.53	4.18	6.43	4.55
Benzene	3.94	0.53	2.06	0.30	10.45	5.07	8.55	5.07	10.07	4.76	8.30	5.02
Toluene	5.28	0.76	1.82	0.36	11.98	7.45	10.36	7.76	12.55	7.14	10.78	7.65
Other												
Nitrous Oxide	0.86	0.20	0.63	0.16	0.10	0.27	0.63	0.21	0.25	0.28	0.51	0.15
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX E

COMPUTER PRINTOUTS OF THE TEST RESULTS

TABLE E-1. TEST NO. 911-1 EMISSIONS RESULTS

PVM - 911 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 911-11 RUN 2
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 91
DATE 9/27/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 2488 KM(1542 MILES)

BAROMETER 743.20 MM HG(29.26 IN HG)
RELATIVE HUMIDITY 58 PCT
BAG RESULTS

DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 10.2 GM/KG
NOX HUMIDITY CORRECTION FACTOR .98

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	711.2 (28.0)	711.2 (28.0)	711.2 (28.0)	711.2 (28.0)
BLOWER INLET P MM. H2O(IN. H2O)	698.5 (27.5)	698.5 (27.5)	698.5 (27.5)	698.5 (27.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	33.3 (110.0)	33.3 (111.0)	33.3 (110.0)
BLOWER REVOLUTIONS	98674	64884	98683	64850
CVS FLOW STD. CU. METRES(SCF)	77.8 (2718.4)	132.4 (4678.0)	77.8 (2719.8)	132.4 (4676.6)
HC SAMPLE METER/RANGE/PPM	37.4/ 2/ 38	11.3/ 2/ 11	13.7/ 2/ 14	4.5/ 2/ 10
HC BCKGRD METER/RANGE/PPM	10.2/ 2/ 10	10.0/ 2/ 13	8.5/ 2/ 9	4.3/ 2/ 4
CO SAMPLE METER/RANGE/PPM	88.6/11/ 933	7.2/13/ 7	14.0/13/ 13	6.6/13/ 6
CO BCKGRD METER/RANGE/PPM	2.8/11/ 4	5.4/13/ 5	2.3/13/ 2	1.8/13/ 2
CO2 SAMPLE METER/RANGE/PCT	49.2/ 3/ 1.26	91.4/ 3/ .70	57.2/ 3/ 1.01	91.1/ 3/ .70
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.4/ 3/ .06	3.6/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	90.0/ 2/ 90	5.8/ 2/ 6	27.3/ 2/ 27	5.4/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.0/ 2/ 1	.8/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	10.36	18.99	13.27	19.18
HC CONCENTRATION PPM	29	2	6	1
CO CONCENTRATION PPM	487	2	11	5
CO2 CONCENTRATION PCT	1.21	.65	.96	.64
NOX CONCENTRATION PPM	29.0	4.4	26.6	5.0
HC MASS GRAMS	1.27	.19	.26	.08
CO MASS GRAMS	36.44	.84	.46	.70
CO2 MASS GRAMS	1648.5	1569.7	1358.6	1562.6
NOX MASS GRAMS	9.20	1.21	3.89	1.26
HC GRAMS/KM	.82	.12	.05	.01
CO GRAMS/KM	6.37	.05	.17	.11
CO2 GRAMS/KM	296.9	259.9	239.2	253.9
NOX GRAMS/KM	.73	.20	.67	.20
FUEL CONSUMPTION BY CB L/100KM	13.11	10.88	10.01	10.89
RUN TIME SECONDS	504	867	504	867
AVG. EXH. OXYGEN PERCENT	9.95	6.19	6.98	6.86
CATALYST AVG. TEMP. DEG. C	953	929	384	923
CATALYST MAX. TEMP. DEG. C	994	964	987	961
MEASURED DISTANCE KM	5.73	6.16	5.74	6.16
DFC, WET (DRY)	.931 (.920)		.939 (.928)	
SCF, WET (DRY)	1.000 (.988)		1.000 (.988)	
VOL (SCM)	209.4		209.4	
KM (MEASURED)	11.89		11.91	

COMPOSITE RESULTS

TEST NUMBER		911-11	TOTAL FUEL SULFUR	MG/KM	23.80	CARBON DIOXIDE	G/KM	287.8
BAROMETER	MM HG	743.2	AVG. EXH. OXYGEN	PCT	6.85	FUEL CONSUMPTION	L/100KM	11.11
HUMIDITY	G/KG	10.2	CATALYST AVG. TEMP.	DEG C	924	HYDROCARBONS (THC)	G/KM	.07
TEMPERATURE	DEG C	22.8	CATALYST MAX. TEMP.	DEG C	944	CARBON MONOXIDE	G/KM	1.24
						OXIDES OF NITROGEN	G/KM	.44

	3-BAG	(4-BAG)
CARBON DIOXIDE G/KM	287.8	(287.5)
FUEL CONSUMPTION L/100KM	11.11	(11.09)
HYDROCARBONS (THC) G/KM	.07	(.07)
CARBON MONOXIDE G/KM	1.24	(1.41)
OXIDES OF NITROGEN G/KM	.44	(.44)

PVM - 911 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 91
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	911-12	911-13
TEST CYCLE	SBT	HFET
RUN NUMBER	2	2
DATE	9/27/78	9/27/78 / /
ODOMETER	2509KM(1559MILES)	2596KM(1582MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.3 / 74.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	58.7	58.4
BAROMETER, MM HG(IN HG)	743.7 (29.28)	743.7 (29.28)
RUN TIME, SECONDS	1347	768
BLOWER DIF P MM. H2O(IN. H2O)	711.2 (28.0)	711.2 (28.0)
BLOWER INLET P MM. H2O(IN. H2O)	698.5 (27.5)	698.5 (27.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.8 (113.0)	48.4 (120.0)
BLOWER REVOLUTIONS	112265	61716
CVS FLOW STD. CU. METRES(SCF)	212.7 (7511.4)	117.5 (4148.7)
HC SAMPLE METER/RANGE/PPM	12.2/ 2/ 12	10.6/ 2/ 11
HC BCKGRD METER/RANGE/PPM	12.1/ 2/ 12	10.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	9.3/13/ 9	11.3/13/ 11
CO BCKGRD METER/RANGE/PPM	4.3/13/ 4	4.9/13/ 5
CO2 SAMPLE METER/RANGE/PCT	68.6/ 3/ 1.24	82.1/ 3/ 1.51
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	96.9/ 2/ 96	79.2/ 2/ 79
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.7/ 2/ 2
HC CONCENTRATION PPM	1	1
CO CONCENTRATION PPM	3	6
CO2 CONCENTRATION PCT	1.18	1.96
NOX CONCENTRATION PPM	95.2	71.7
HC MASS GRAMS	.18	.09
CO MASS GRAMS	.75	.89
CO2 MASS GRAMS	9618.5	5196.9
NOX MASS GRAMS	17.58	15.96
DFC, WET (DRY)	.908 (.894)	.887 (.874)
SCF, WET (DRY)	1.000 (.974)	1.000 (.977)
VOL (SCM)	212.7	117.5
KM (MEASURED)	21.93	14.90

TEST NUMBER,	PVNT	911-12	911-13
BAROMETER,	MM HG	743.7	743.7
HUMIDITY,	G/KG	9.2	9.4
TEMPERATURE,	DEG C	23.3	24.4
TOTAL FUEL SULFUR,	MG/KM	19.25	17.57
AVG. EXH. OXYGEN,	PCT	5.69	5.16
CATALYST AVG. TEMP.,	DEG C	985	518
CATALYST MAX. TEMP.,	DEG C	994	563
CARBON DIOXIDE,	G/KM	210.4	191.9
FUEL CONSUMPTION,	L/100KM	8.98	8.20
HYDROCARBONS,	G/KM	.01	.01
CARBON MONOXIDE,	G/KM	.03	.05
OXIDES OF NITROGEN,	G/KM	.90	.99

TABLE E-2. TEST NO. 411-2 EMISSIONS RESULTS

PVM - 411 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4489-001

TEST NO. 411-21 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 10/19/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 2439 KM(1823 MILES)

BAROMETER 744.85 MM HG(29.44 IN HG)
RELATIVE HUMIDITY 24 PCT
BAG RESULTS

DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
ABS. HUMIDITY 5.2 GM/KG

NOX HUMIDITY CORRECTION FACTOR .86

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG, C(DEG, F)	42.8 (109.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40620	70950	40750	70911
CVS FLOW STD, CU, METRES(SCF)	77.1 (2722.8)	133.6 (4718.2)	77.2 (2728.9)	133.6 (4715.7)
HC SAMPLE METER/RANGE/PPM	44.5/ 2/ 44	19.7/ 2/ 20	30.2/ 2/ 30	17.2/ 2/ 17
HC BCKGRD METER/RANGE/PPM	18.4/ 2/ 18	17.1/ 2/ 17	13.8/ 2/ 14	13.4/ 2/ 13
CO SAMPLE METER/RANGE/PPM	89.3/11/ 934	67.4/13/ 63	67.8/12/ 163	86.1/13/ 94
CO BCKGRD METER/RANGE/PPM	8.6/11/ 23	20.4/13/ 14	4.8/12/ 9	8.3/13/ 8
CO2 SAMPLE METER/RANGE/PCT	75.8/ 3/ 1.38	96.8/ 3/ .81	64.3/ 3/ 1.15	95.0/ 3/ .77
CO2 BCKGRD METER/RANGE/PCT	4.4/ 3/ .08	6.2/ 3/ .10	5.4/ 3/ .08	5.2/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	20.4/ 2/ 21	6.6/ 2/ 7	14.2/ 2/ 14	6.8/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.3/ 2/ 1	1.1/ 2/ 1	1.2/ 2/ 1
DILUTION FACTOR	9.37	16.98	11.94	17.23
HC CONCENTRATION PPM	28	9	18	5
CO CONCENTRATION PPM	488	34	141	38
CO2 CONCENTRATION PCT	1.38	.72	1.07	.70
NOX CONCENTRATION PPM	14.7	5.9	13.2	5.7
HC MASS GRAMS	1.22	.38	.78	.38
CO MASS GRAMS	38.98	5.30	18.64	5.85
CO2 MASS GRAMS	1856.7	1761.1	1517.8	1782.1
NOX MASS GRAMS	2.96	1.16	1.66	1.23
HC GRAMS/KM	.21	.05	.13	.06
CO GRAMS/KM	6.17	.84	2.17	.95
CO2 GRAMS/KM	314.0	282.6	246.9	276.8
NOX GRAMS/KM	.49	.19	.28	.20
FUEL CONSUMPTION BY CB L/100KM	14.84	12.13	11.38	11.89
RUN TIME SECONDS	505	867	505	866
AVG. EXH. OXYGEN PERCENT	4.31	5.48	5.59	6.90
CATALYST AVG. TEMP. DEG. C	552	599	598	589
CATALYST MAX. TEMP. DEG. C	752	619	679	601
MEASURED DISTANCE KM	5.82	6.14	5.82	6.17
DFC, WET (DRY)	.922 (.921)		.931 (.930)	
SCF, WET (DRY)	1.000 (.999)		1.000 (.998)	
VOL (SCM)	210.6		210.8	
KM (MEASURED)	12.01		11.99	

COMPOSITE RESULTS

				3-BAG	(4-BAG)
TEST NUMBER	411-21	TOTAL FUEL SULFUR MG/KM	26.37	CARBON DIOXIDE G/KM	289.3 (288.2)
BAROMETER MM HG	744.0	AVG. EXH. OXYGEN PCT	5.60	FUEL CONSUMPTION L/100KM	12.30 (12.22)
HUMIDITY G/KG	5.2	CATALYST AVG. TEMP. DEG C	536	HYDROCARBONS (THC) G/KM	.10 (.11)
TEMPERATURE DEG C	26.7	CATALYST MAX. TEMP. DEG C	752	CARBON MONOXIDE G/KM	2.33 (2.35)
				OXIDES OF NITROGEN G/KM	.26 (.27)

PVM - 411 SBT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4489-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	411-22	411-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	10/19/78	10/19/78 / /
ODOMETER	2463KM(1841MILES)	3001KM(1865MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.6 / 78.0	25.6 / 78.0
RELATIVE HUMIDITY, PCT	33.4	33.4
BAROMETER, MM HG(IN HG)	750.1 (29.53)	750.1 (29.53)
RUN TIME, SECONDS	1347	766
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG, C(DEG, F)	41.7 (107.0)	42.2 (108.0)
BLOWER REVOLUTIONS	112789	61693
CVS FLOW STD, CU, METRES(SCF)	214.6 (7580.4)	117.2 (4141.0)
HC SAMPLE METER/RANGE/PPM	17.6/ 2/ 18	16.4/ 2/ 17
HC BCKGRD METER/RANGE/PPM	11.3/ 2/ 11	11.4/ 2/ 11
CO SAMPLE METER/RANGE/PPM	93.3/13/ 64	91.1/13/ 63
CO BCKGRD METER/RANGE/PPM	5.1/13/ 5	5.0/13/ 5
CO2 SAMPLE METER/RANGE/PCT	75.5/ 3/ 1.38	99.4/ 3/ 1.78
CO2 BCKGRD METER/RANGE/PCT	5.3/ 3/ .08	5.4/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	22.5/ 2/ 23	32.7/ 2/ 33
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.3/ 2/ 1
HC CONCENTRATION PPM	9	9
CO CONCENTRATION PPM	57	56
CO2 CONCENTRATION PCT	1.38	1.78
NOX CONCENTRATION PPM	21.9	31.6
HC MASS GRAMS	.92	.47
CO MASS GRAMS	14.22	7.69
CO2 MASS GRAMS	5183.8	3669.8
NOX MASS GRAMS	7.81	6.29
DFC, WET (DRY)	.847 (.843)	.847 (.843)
SCF, WET (DRY)	1.000 (.983)	1.000 (.979)
VOL (SCM)	214.6	117.2
KM (MEASURED)	21.86	16.52
TEST NUMBER, PVM-ST	411-22	411-23
BAROMETER, MM HG	750.1	750.1
HUMIDITY, G/KG	6.9	6.9
TEMPERATURE, DEG C	25.6	25.6
TOTAL FUEL SULFUR, MG/KM	21.55	28.31
AVG. EXH. OXYGEN, PCT	5.28	5.22
CATALYST AVG. TEMP., DEG C	633	716
CATALYST MAX. TEMP., DEG C	791	796
CARBON DIOXIDE, G/KM	239.9	221.3
FUEL CONSUMPTION, L/100KM	10.05	9.98
HYDROCARBONS, G/KM	.09	.03
CARBON MONOXIDE, G/KM	.65	.96
OXIDES OF NITROGEN, G/KM	.36	.38

TABLE E-3. TEST NO. 411-3 EMISSIONS RESULTS

PVM - 411 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4489-001

TEST NO. 411-31 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 10/20/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 3089 KM(1892 MILES)

BAROMETER 745.74 MM HG(29.36 IN HG)
RELATIVE HUMIDITY 34 PCT

DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 6.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .88

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	43.3 (110.0)	44.4 (112.0)	44.4 (112.0)
BLOWER REVOLUTIONS	90866	69795	90760	70200
CVS FLOW STD. CU. METRES(SCF)	77.8 (2725.8)	131.5 (4644.3)	76.7 (2710.7)	132.8 (4689.8)
HC SAMPLE METER/RANGE/PPM	37.3/ 2/ 37	15.7/ 2/ 16	23.4/ 2/ 23	17.2/ 2/ 17
HC BCKGRD METER/RANGE/PPM	12.1/ 2/ 12	12.7/ 2/ 13	13.8/ 2/ 13	14.2/ 2/ 14
CO SAMPLE METER/RANGE/PPM	71.6/11/ 389	27.8/13/ 25	77.7/13/ 58	29.1/13/ 26
CO BCKGRD METER/RANGE/PPM	3.2/11/ 10	2.2/13/ 7	5.4/13/ 5	5.3/13/ 5
CO2 SAMPLE METER/RANGE/PCT	73.8/ 3/ 1.33	99.4/ 3/ .76	62.8/ 3/ 1.12	99.7/ 3/ .77
CO2 BCKGRD METER/RANGE/PCT	9.1/ 3/ .06	9.4/ 3/ .08	9.7/ 3/ .07	9.3/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	28.4/ 2/ 26	7.7/ 2/ 8	16.8/ 2/ 16	8.4/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	.4/ 2/ 1	.4/ 2/ 1	.4/ 2/ 1
DILUTION FACTOR	4.83	17.53	11.89	17.98
HC CONCENTRATION PPM	26	9	11	9
CO CONCENTRATION PPM	289	18	51	21
CO2 CONCENTRATION PCT	1.27	.69	1.05	.69
NOX CONCENTRATION PPM	29.9	6.9	15.2	7.6
HC MASS GRAMS	1.18	.28	.50	.29
CO MASS GRAMS	25.95	2.78	9.57	3.22
CO2 MASS GRAMS	1799.2	1668.1	1979.9	1667.8
NOX MASS GRAMS	3.22	1.51	1.95	1.67
HC GRAMS/KM	.20	.05	.09	.05
CO GRAMS/KM	4.46	.25	.79	.58
CO2 GRAMS/KM	309.3	269.1	326.7	271.2
NOX GRAMS/KM	.55	.24	.32	.27
FUEL CONSUMPTION BY CB L/100KM	13.53	11.58	10.98	11.62
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	5.19	6.91	5.91	6.92
CATALYST AVG. TEMP. DEG. C	-	-	378	965
CATALYST MAX. TEMP. DEG. C	-	-	469	993
MEASURED DISTANCE KM	5.82	6.17	5.79	6.15
DFC, WET (DRY)	.926 (.922)		.933 (.928)	
SCF, WET (DRY)	1.000 (.996)		1.000 (.987)	
VOL (SCM)	206.7		208.9	
KM (MEASURED)	11.99		11.99	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	411-31	TOTAL FUEL SULFUR MG/KM 25.27		CARBON DIOXIDE G/KM	278.8	(279.4)
BAROMETER MM HG	745.7	AVG. EXH. OXYGEN PCT 6.43		FUEL CONSUMPTION L/100KM	11.74	(11.82)
HUMIDITY G/KG	6.9	CATALYST AVG. TEMP. DEG C -		HYDROCARBONS (THC) G/KM	.09	(.09)
TEMPERATURE DEG C	23.9	CATALYST MAX. TEMP. DEG C 469		CARBON MONOXIDE G/KM	1.38	(1.40)
				OXIDES OF NITROGEN G/KM	.33	(.39)

PVM - 411 SBT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4489-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	411-32	411-33
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	10/20/78	10/20/78 / /
ODOMETER	3047KM(1906MILES)	3106KM(1930MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	22.8 / 73.0	24.9 / 76.8
RELATIVE HUMIDITY, PCT	46.3	38.3
BAROMETER, MM HG(IN HG)	745.7 (29.36)	745.7 (29.36)
RUN TIME, SECONDS	1367	766
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.9 (111.0)	33.9 (112.0)
BLOWER REVOLUTIONS	119701	69891
CVS FLOW STD. CU. METRES(SCF)	216.3 (7640.0)	120.9 (4268.9)
HC SAMPLE METER/RANGE/PPM	20.3/ 2/ 20	20.1/ 2/ 20
HC BCKGRD METER/RANGE/PPM	13.3/ 2/ 13	12.9/ 2/ 12
CO SAMPLE METER/RANGE/PPM	73.1/13/ 54	82.1/13/ 60
CO BCKGRD METER/RANGE/PPM	5.1/13/ 5	7.1/13/ 7
CO2 SAMPLE METER/RANGE/PCT	99.7/ 3/ 1.36	95.7/ 3/ 1.30
CO2 BCKGRD METER/RANGE/PCT	9.2/ 3/ .10	8.6/ 3/ .13
NOX SAMPLE METER/RANGE/PPM	29.8/ 2/ 25	33.2/ 2/ 33
NOX BCKGRD METER/RANGE/PPM	1.6/ 2/ 2	2.3/ 2/ 2
HC CONCENTRATION PPM	8	4
CO CONCENTRATION PPM	99	61
CO2 CONCENTRATION PCT	1.27	1.68
NOX CONCENTRATION PPM	23.9	31.8
HC MASS GRAMS	1.09	.65
CO MASS GRAMS	12.39	7.18
CO2 MASS GRAMS	5048.9	3723.9
NOX MASS GRAMS	8.91	6.51
DFC, WET (DRY)	.898 (.890)	.865 (.860)
SCF, WET (DRY)	1.000 (.979)	1.000 (.977)
VOL (SCM)	216.3	120.9
KM (MEASURED)	21.78	16.52
TEST NUMBER,	PVM-SBT	411-32 411-33
BAROMETER,	MM HG	745.7 745.7
HUMIDITY,	G/KG	8.1 7.9
TEMPERATURE,	DEG C	22.8 29.9
TOTAL FUEL SULFUR,	MG/KM	21.30 20.70
AVG. EXH. OXYGEN,	PCT	5.91 9.21
CATALYST AVG. TEMP.,	DEG C	596 688
CATALYST MAX. TEMP.,	DEG C	749 802
CARBON DIOXIDE,	G/KM	231.8 225.9
FUEL CONSUMPTION,	L/100KM	9.99 9.66
HYDROCARBONS,	G/KM	.08 .09
CARBON MONOXIDE,	G/KM	.57 .93
OXIDES OF NITROGEN,	G/KM	.91 .39

TABLE E-4. TEST NO. 412-1 EMISSIONS RESULTS

PVM - 412 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 412-11 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 12/ 8/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 0 KM(0 MILES)

BAROMETER 744.73 MM HG(29.32 IN HG)
RELATIVE HUMIDITY 29 PCT
DRY BULB TEMP. 21.7 DEG C(71.0 DEG F)
ABS. HUMIDITY 3.9 GM/KG
NOX HUMIDITY CORRECTION FACTOR .82

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H20(IN, H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H20(IN, H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	42.0 (108.0)	42.8 (109.0)	42.8 (109.0)	42.2 (108.0)
BLOWER REVOLUTIONS	40896	49709	40401	49639
CVS FLOW STD. CU. METRES(SCF)	76.7 (2710.4)	132.0 (4661.6)	76.7 (2710.7)	131.8 (4653.5)
HC SAMPLE METER/RANGE/PPM	10.8/ 2/ 41	9.5/ 2/ 10	9.7/ 2/ 10	7.9/ 2/ 7
HC BCKGRD METER/RANGE/PPM	7.5/ 2/ 8	6.8/ 2/ 7	5.8/ 2/ 6	4.7/ 2/ 5
CO SAMPLE METER/RANGE/PPM	28.6/ 3/ 599	5.9/13/ 5	9.2/13/ 9	2.8/13/ 2
CO BCKGRD METER/RANGE/PPM	.8/ 3/ 11	1.9/13/ 1	1.8/13/ 1	.9/13/ 1
CO2 SAMPLE METER/RANGE/PCT	10.3/ 3/ 1.27	11.9/ 3/ .71	5.9/ 3/ 1.00	10.3/ 3/ .68
CO2 BCKGRD METER/RANGE/PCT	3.3/ 3/ .05	3.7/ 3/ .06	3.2/ 3/ .05	2.6/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	34.8/ 2/ 36	8.8/ 2/ 9	33.6/ 2/ 35	8.8/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	.6/ 2/ 1	.8/ 2/ 1	.9/ 2/ 0
DILUTION FACTOR	10.06	18.75	13.36	19.58
HC CONCENTRATION PPM	39	3	5	3
CO CONCENTRATION PPM	565	1	3	2
CO2 CONCENTRATION PCT	1.22	.66	.96	.65
NOX CONCENTRATION PPM	36.9	8.2	33.1	7.8
HC MASS GRAMS	1.51	.23	.20	.22
CO MASS GRAMS	50.96	.17	.29	.29
CO2 MASS GRAMS	1781.9	1949.9	1349.1	1567.7
NOX MASS GRAMS	4.39	1.70	3.48	1.61
HC GRAMS/KM	.26	.09	.09	.09
CO GRAMS/KM	8.78	.03	.04	.04
CO2 GRAMS/KM	296.7	357.6	232.5	251.5
NOX GRAMS/KM	.76	.27	.64	.26
FUEL CONSUMPTION AV CB L/100KM	13.28	11.00	9.43	10.79
RUN TIME SECONDS	504	867	505	867
AVG. EXH. OXYGEN PERCENT	-	-	-	-
CATALYST AVG. TEMP. DEG. C	355	917	344	398
CATALYST MAX. TEMP. DEG. C	504	998	961	953
MEASURED DISTANCE KM	5.88	6.14	5.78	6.14
DFC, WET (DRY)		.930 (.929)		.998 (.934)
SCF, WET (DRY)		1.000 (.998)		1.000 (.991)
VOL (SCM)		208.7		208.5
KM (MEASURED)		11.99		11.98

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	412-11	TOTAL FUEL SULFUR MG/KM	23.96	CARBON DIOXIDE G/KM	298.6	(257.0)
BAROMETER MM HG	744.7	AVG. EXH. OXYGEN PCT	-	FUEL CONSUMPTION L/100KM	11.18	(11.10)
HUMIDITY G/KG	3.9	CATALYST AVG. TEMP. DEG C	397	HYDROCARBONS (THC) G/KM	.08	(.08)
TEMPERATURE DEG C	21.7	CATALYST MAX. TEMP. DEG C	504	CARBON MONOXIDE G/KM	1.89	(1.89)
				OXIDES OF NITROGEN G/KM	.99	(.98)

PVM - 412 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	412-12	412-13
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	12/ 8/78	12/ 8/78 / /
ODOMETER	0KM(0MILES)	0KM(0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	22.8 / 73.0	23.9 / 75.0
RELATIVE HUMIDITY, PCT	14.7	21.8
BAROMETER, MM HG(IN HG)	745.2 (29.34)	745.2 (29.34)
RUN TIME, SECONDS	1398	766
BLOWER DIF P MM, H20(IN, H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H20(IN, H20)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	42.2 (108.0)	42.2 (108.0)
BLOWER REVOLUTIONS	118302	61633
CVS FLOW STD. CU. METRES(SCF)	212.6 (7510.7)	116.7 (4122.1)
HC SAMPLE METER/RANGE/PPM	7.9/ 2/ 7	6.9/ 2/ 7
HC BCKGRD METER/RANGE/PPM	4.3/ 2/ 4	4.7/ 2/ 5
CO SAMPLE METER/RANGE/PPM	3.9/13/ 4	3.6/13/ 4
CO BCKGRD METER/RANGE/PPM	1.7/13/ 2	1.6/13/ 2
CO2 SAMPLE METER/RANGE/PCT	10.9/ 3/ 1.16	7.2/ 3/ 1.05
CO2 BCKGRD METER/RANGE/PCT	2.9/ 3/ .09	2.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	36.2/ 2/ 36	64.7/ 2/ 70
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.9/ 2/ 1
HC CONCENTRATION PPM	3	3
CO CONCENTRATION PPM	2	2
CO2 CONCENTRATION PCT	1.12	1.01
NOX CONCENTRATION PPM	35.7	68.9
HC MASS GRAMS	.93	.18
CO MASS GRAMS	.94	.27
CO2 MASS GRAMS	4363.3	3021.3
NOX MASS GRAMS	19.99	12.62
DFC, WET (DRY)	.913 (.913)	.841 (.841)
SCF, WET (DRY)	1.000 (.999)	1.000 (.986)
VOL (SCM)	212.6	116.7
KM (MEASURED)	21.81	14.91

TEST NUMBER,	PVM-SBT	412-12	412-13
BAROMETER,	MM HG	745.2	745.2
HUMIDITY,	G/KG	3.9	4.1
TEMPERATURE,	DEG C	22.8	23.9
TOTAL FUEL SULFUR,	MG/KM	18.31	16.59
AVG. EXH. OXYGEN,	PCT	-	-
CATALYST AVG. TEMP.,	DEG C	439	508
CATALYST MAX. TEMP.,	DEG C	529	592
CARBON DIOXIDE,	G/KM	200.0	180.8
FUEL CONSUMPTION,	L/100KM	8.59	7.72
HYDROCARBONS,	G/KM	.02	.01
CARBON MONOXIDE,	G/KM	.02	.02
OXIDES OF NITROGEN,	G/KM	.69	.96

TABLE E-5. TEST NO. 412-2 EMISSIONS RESULTS

PVM - 412 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4484-001

TEST NO. 412-21 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 10/13/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404
ODOMETER 5583 KM(3469 MILES)

BAROMETER 751.33 MM HG(29.58 IN HG)
RELATIVE HUMIDITY 52 PCT
BAG RESULTS

DRY BULB TEMP. 21.7 DEG C(71.0 DEG F)
ABS. HUMIDITY 8.5 GM/KG

NOX HUMIDITY CORRECTION FACTOR .93

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	32.2 (108.0)	32.8 (109.0)
BLOWER REVOLUTIONS	40643	69728	40849	69625
CVS FLOW STD. CU. METRES(SCF)	77.3 (2730.0)	132.6 (4683.2)	77.3 (2731.4)	132.5 (4680.7)
HC SAMPLE METER/RANGE/PPM	28.6/ 3/ 886	14.4/ 2/ 15	22.2/ 2/ 22	13.6/ 2/ 14
HC BCKGRD METER/RANGE/PPM	1.3/ 3/ 13	14.4/ 2/ 15	14.5/ 2/ 14	13.6/ 2/ 14
CO SAMPLE METER/RANGE/PPM	34.2/ 3/ 806	15.6/13/ 15	29.0/13/ 23	13.6/13/ 13
CO BCKGRD METER/RANGE/PPM	.4/ 3/ 4	1.0/13/ 1	10.6/13/ 10	10.6/13/ 10
CO2 SAMPLE METER/RANGE/PCT	67.0/ 3/ 1.20	33.3/ 3/ .74	54.1/ 3/ 1.05	42.2/ 3/ .72
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	4.0/ 3/ .06	4.1/ 3/ .06	3.4/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	29.1/ 2/ 29	5.8/ 2/ 6	17.1/ 2/ 17	5.6/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.1/ 2/ 1	1.1/ 2/ 1	1.1/ 2/ 1
DILUTION FACTOR	18.26	18.05	18.77	18.54
HC CONCENTRATION PPM	899	1	4	1
CO CONCENTRATION PPM	766	6	13	3
CO2 CONCENTRATION PCT	1.15	.68	.99	.66
NOX CONCENTRATION PPM	23.1	4.8	14.1	4.6
HC MASS GRAMS	10.89	.06	.14	.08
CO MASS GRAMS	68.91	.88	1.15	.98
CO2 MASS GRAMS	1630.8	1654.8	1398.2	1607.1
NOX MASS GRAMS	3.19	1.13	2.22	1.08
HC GRAMS/KM	1.84	.01	.03	.01
CO GRAMS/KM	11.93	.19	.20	.08
CO2 GRAMS/KM	282.8	266.0	248.7	257.3
NOX GRAMS/KM	.55	.18	.38	.17
FUEL CONSUMPTION BY CB L/100KM	13.13	11.36	10.84	10.99
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	6.21	7.09	6.11	7.22
CATALYST AVG. TEMP. DEG. C	485	563	498	554
CATALYST MAX. TEMP. DEG. C	713	539	699	631
MEASURED DISTANCE KM	8.77	8.02	8.81	8.04
DFC, WET (DRY)	.929 (.919)		.932 (.922)	
SCF, WET (DRY)	1.000 (.991)		1.000 (.992)	
VOL (SCM)	204.9		204.9	
KM (MEASURED)	11.99		18.05	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	412-21	TOTAL FUEL SULFUR MG/KM	29.50	CARBON DIOXIDE	G/KM	262.5	(260.0)
BAROMETER MM HG	751.3	AVG. EXH. OXYGEN PCT	6.75	FUEL CONSUMPTION	L/100KM	11.93	(11.32)
HUMIDITY G/KG	8.6	CATALYST AVG. TEMP. DEG C	534	HYDROCARBONS (THC)	G/KM	.08	(.01)
TEMPERATURE DEG C	21.7	CATALYST MAX. TEMP. DEG C	713	CARBON MONOXIDE	G/KM	2.60	(2.59)
				OXIDES OF NITROGEN	G/KM	.31	(.31)

PVM - 412 SBT VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4484-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404

TEST NUMBER	412-22	412-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	10/13/78	10/13/78 / /
ODOMETER	0KM(-0MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	28.0 / 27.0	16.7 / 62.0
RELATIVE HUMIDITY, PCT	38.7	50.1
BAROMETER, MM HG(IN HG)	752.6 (29.63)	751.3 (29.58)
RUN TIME, SECONDS	1397	766
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	32.2 (108.0)	33.3 (110.0)
BLOWER REVOLUTIONS	112197	61639
CVS FLOW STD. CU. METRES(SCF)	219.2 (7744.2)	117.0 (4132.4)
HC SAMPLE METER/RANGE/PPM	22.1/ 2/ 22	14.7/ 2/ 20
HC BCKGRD METER/RANGE/PPM	22.1/ 2/ 22	14.7/ 2/ 20
CO SAMPLE METER/RANGE/PPM	34.7/13/ 33	21.5/13/ 20
CO BCKGRD METER/RANGE/PPM	10.6/13/ 10	9.4/13/ 10
CO2 SAMPLE METER/RANGE/PCT	73.3/ 3/ 1.33	84.4/ 3/ 1.61
CO2 BCKGRD METER/RANGE/PCT	4.4/ 3/ .07	4.8/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	18.0/ 2/ 18	10.2/ 2/ 10
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	2.8/ 2/ 2
HC CONCENTRATION PPM	2	2
CO CONCENTRATION PPM	23	11
CO2 CONCENTRATION PCT	1.27	1.55
NOX CONCENTRATION PPM	10.8	8.4
HC MASS GRAMS	.27	.14
CO MASS GRAMS	5.61	1.53
CO2 MASS GRAMS	4481.8	3318.1
NOX MASS GRAMS	3.44	1.53
DFC, WET (DRY)	.908 (.896)	.879 (.871)
SCF, WET (DRY)	1.000 (.989)	1.000 (.992)
VOL (SCM)	219.2	117.0
KM (MEASURED)	22.06	10.69
TEST NUMBER, PVM-ST	412-22	412-23
BAROMETER, MM HG	752.6	751.3
HUMIDITY, G/KG	7.1	6.0
TEMPERATURE, DEG C	28.0	16.7
TOTAL FUEL SULFUR, MG/KM	30.70	19.29
AVG. EXH. OXYGEN, PCT	6.18	9.15
CATALYST AVG. TEMP., DEG C	630	488
CATALYST MAX. TEMP., DEG C	769	765
CARBON DIOXIDE, G/KM	228.4	199.2
FUEL CONSUMPTION, L/100KM	9.66	9.61
HYDROCARBONS, G/KM	.01	.01
CARBON MONOXIDE, G/KM	.25	.09
OXIDES OF NITROGEN, G/KM	.18	.10

TABLE E-6. TEST ID, 402-3 EMISSIONS RESULTS

PVM - 412 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4484-001

TEST NO. 412-31 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 12/19/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404
ODOMETER 5478 KM(3520 MILES)

BAROMETER 751.84 MM HG(29.60 IN HG)
RELATIVE HUMIDITY 20 PCT
BAG RESULTS

DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
ABS. HUMIDITY 3.8 GM/KG
NOX HUMIDITY CORRECTION FACTOR .81

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIP P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.9 (111.0)	33.3 (110.0)	32.8 (109.0)	31.7 (107.0)
BLOWER REVOLUTIONS	90739	64082	90657	64733
CVS FLOW STD. CU. METRES(SCF)	76.9 (2719.7)	130.9 (4609.8)	76.8 (2719.3)	132.1 (4669.7)
HC SAMPLE METER/RANGE/PPM	23.6/ 3/ 236	18.0/ 2/ 18	22.0/ 2/ 22	12.6/ 2/ 13
HC BCKGRD METER/RANGE/PPM	2.1/ 3/ 21	18.0/ 2/ 18	14.9/ 2/ 14	12.6/ 2/ 13
CO SAMPLE METER/RANGE/PPM	30.8/ 3/ 781	8.6/13/ 8	13.6/13/ 13	7.7/13/ 7
CO BCKGRD METER/RANGE/PPM	.8/ 3/ 18	7.3/13/ 7	3.6/13/ 4	3.3/13/ 3
CO2 SAMPLE METER/RANGE/PCT	69.9/ 3/ 1.28	91.6/ 3/ .71	59.9/ 3/ 1.05	93.2/ 3/ .79
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06	9.2/ 3/ .06	3.9/ 3/ .06	9.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	26.9/ 2/ 27	6.7/ 2/ 7	13.2/ 2/ 13	7.9/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.8/ 2/ 1	.8/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	4.46	18.87	18.71	18.18
HC CONCENTRATION PPM	217	1	4	1
CO CONCENTRATION PPM	683	1	4	4
CO2 CONCENTRATION PCT	1.20	.65	1.00	.68
NOX CONCENTRATION PPM	26.2	5.4	12.5	7.1
HC MASS GRAMS	4.52	.07	.34	.08
CO MASS GRAMS	41.12	.23	.85	.66
CO2 MASS GRAMS	1484.5	1843.5	1981.6	1843.6
NOX MASS GRAMS	3.13	1.21	1.99	1.97
HC GRAMS/KM	1.66	.01	.07	.01
CO GRAMS/KM	10.99	.09	.15	.11
CO2 GRAMS/KM	387.6	296.1	390.9	369.8
NOX GRAMS/KM	.53	.19	.26	.29
FUEL CONSUMPTION AV CR L/100KM	13.20	10.96	10.30	11.31
RUN TIME SECONDS	505	868	505	867
AVG. EXH. OXYGEN PERCENT	5.51	6.67	6.25	6.76
CATALYST AVG. TEMP. DEG. C	580	553	527	544
CATALYST MAX. TEMP. DEG. C	764	667	645	634
MEASURED DISTANCE KM	5.84	6.30	5.82	6.21
DFC, WET (DRY)	.929 (.924)		.936 (.931)	
SCF, WET (DRY)	1.000 (.992)		1.000 (.992)	
VOL (SCM)	207.8		208.9	
KM (MEASURED)	12.14		12.03	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	412-31	TOTAL FUEL SULFUR MG/KM	23.54	CARBON DIOXIDE G/KM	252.7	(258.5)
BAROMETER MM HG	751.8	AVG. EXH. OXYGEN PCT	6.48	FUEL CONSUMPTION L/100KM	10.48	(11.23)
HUMIDITY G/KG	3.8	CATALYST AVG. TEMP. DEG C	539	HYDROCARBONS (THC) G/KM	.35	(.36)
TEMPERATURE DEG C	24.4	CATALYST MAX. TEMP. DEG C	764	CARBON MONOXIDE G/KM	8.72	(8.29)
				OXIDES OF NITROGEN G/KM	.28	(.29)

PVM - 412 SBT VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4484-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404

TEST NUMBER	412-32	412-33
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	12/19/78	12/19/78 / /
ODOMETER	5708KM(3547MILES)	5784KM(3593MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.0 / 77.0	25.0 / 77.0
RELATIVE HUMIDITY, PCT	26.5	20.7
BAROMETER, MM HG(IN HG)	751.8 (29.60)	751.8 (29.60)
RUN TIME, SECONDS	1347	766
BLOWER DIP P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.9 (112.0)
BLOWER REVOLUTIONS	118303	61614
CVS FLOW STD. CU. METRES(SCF)	213.7 (7548.5)	117.0 (4133.9)
HC SAMPLE METER/RANGE/PPM	19.9/ 2/ 19	16.9/ 2/ 17
HC BCKGRD METER/RANGE/PPM	19.3/ 2/ 19	16.9/ 2/ 17
CO SAMPLE METER/RANGE/PPM	11.9/13/ 11	12.8/13/ 12
CO BCKGRD METER/RANGE/PPM	3.6/13/ 4	5.9/13/ 6
CO2 SAMPLE METER/RANGE/PCT	71.7/ 3/ 1.38	89.7/ 3/ 1.63
CO2 BCKGRD METER/RANGE/PCT	9.8/ 3/ .07	9.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	20.8/ 2/ 21	12.3/ 2/ 12
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.9/ 2/ 1
HC CONCENTRATION PPM	1	2
CO CONCENTRATION PPM	9	6
CO2 CONCENTRATION PCT	1.23	1.65
NOX CONCENTRATION PPM	19.8	11.1
HC MASS GRAMS	.18	.14
CO MASS GRAMS	1.86	.86
CO2 MASS GRAMS	9822.6	3382.9
NOX MASS GRAMS	6.86	2.09
DFC, WET (DRY)	.903 (.901)	.878 (.878)
SCF, WET (DRY)	1.000 (.998)	1.000 (.998)
VOL (SCM)	213.7	117.0
KM (MEASURED)	21.94	10.51
TEST NUMBER,	PVM-SBT	412-32	412-33
BAROMETER,	MM HG	751.8	751.8
HUMIDITY,	G/KG	5.3	9.1
TEMPERATURE,	DEG C	25.0	25.0
TOTAL FUEL SULFUR,	MG/KM	20.84	18.31
AVG. EXH. OXYGEN,	PCT	5.84	6.73
CATALYST AVG. TEMP.,	DEG C	603	668
CATALYST MAX. TEMP.,	DEG C	721	743
CARBON DIOXIDE,	G/KM	221.3	208.0
FUEL CONSUMPTION,	L/100KM	9.46	8.99
HYDROCARBONS,	G/KM	.01	.01
CARBON MONOXIDE,	G/KM	.09	.05
OXIDES OF NITROGEN,	G/KM	.32	.12

TABLE E-7. TEST NO. 413-1 EMISSIONS RESULTS

PVM - 913 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 913-11 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 91
DATE 1/ 9/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-349
ODOMETER 7419 KM(4610 MILES)

BAROMETER 752.86 MM HG(29.64 IN HG)
RELATIVE HUMIDITY 16 PCT
BAG RESULTS

DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 2.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .88

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	35.6 (116.0)	33.9 (111.0)	34.9 (118.8)	34.9 (118.8)
BLOWER REVOLUTIONS	90978	89699	90538	89821
CVS FLOW STD. CU. METRES(SCF)	77.1 (2723.1)	132.5 (9681.4)	77.1 (2722.5)	132.9 (9675.5)
HC SAMPLE METER/RANGE/PPM	36.2/ 2/ 36	12.3/ 2/ 12	15.5/ 2/ 15	11.9/ 2/ 11
HC BCKGRD METER/RANGE/PPM	13.0/ 2/ 13	11.7/ 2/ 12	10.9/ 2/ 10	10.9/ 2/ 10
CO SAMPLE METER/RANGE/PPM	77.7/11/ 350	18.5/13/ 18	19.5/13/ 19	9.0/13/ 9
CO BCKGRD METER/RANGE/PPM	7.6/11/ 29	17.9/13/ 17	9.6/13/ 9	8.9/13/ 8
CO2 SAMPLE METER/RANGE/PCT	31.0/ 3/ 1.28	93.0/ 3/ .73	99.2/ 3/ 1.05	99.2/ 3/ .76
CO2 BCKGRD METER/RANGE/PCT	9.1/ 3/ .04	9.9/ 3/ .08	9.8/ 3/ .07	9.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	91.3/ 2/ 91	9.7/ 2/ 10	31.5/ 2/ 31	9.6/ 2/ 10
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.2/ 2/ 1	1.1/ 2/ 1	1.9/ 2/ 1
DILUTION FACTOR	10.19	18.19	12.76	17.67
HC CONCENTRATION PPM	29	1	4	2
CO CONCENTRATION PPM	318	1	5	1
CO2 CONCENTRATION PCT	1.23	.66	.98	.67
NOX CONCENTRATION PPM	98.3	8.6	30.5	8.3
HC MASS GRAMS	1.09	.10	.26	.12
CO MASS GRAMS	28.55	.19	.95	.19
CO2 MASS GRAMS	1733.6	1608.3	1382.0	1625.5
NOX MASS GRAMS	9.73	1.73	3.58	1.67
HC GRAMS/KM	.19	.02	.04	.02
CO GRAMS/KM	4.84	.03	.08	.02
CO2 GRAMS/KM	295.0	255.3	235.0	256.1
NOX GRAMS/KM	.80	.27	.61	.26
FUEL CONSUMPTION BY CB L/100KM	12.49	10.98	10.09	10.99
RUN TIME SECONDS	504	867	505	868
AVG. EXH. OXYGEN PERCENT	-	-	-	-
CATALYST AVG. TEMP. DEG. C	-	-	-	-
CATALYST MAX. TEMP. DEG. C	-	-	-	-
MEASURED DISTANCE KM	5.88	6.30	5.88	6.35
DFC, WET (DRY)	.929 (.929)		.935 (.935)	
SCF, WET (DRY)	1.000 (.991)		1.000 (.992)	
VOL (SCM)	209.6		209.5	
KM (MEASURED)	18.18		18.23	

COMPOSITE RESULTS

TEST NUMBER		913-11
BAROMETER	MM HG	752.9
HUMIDITY	G/KG	2.9
TEMPERATURE	DEG C	23.9

TOTAL FUEL SULFUR	MG/KM	23.74
AVG. EXH. OXYGEN	PCT	-
CATALYST AVG. TEMP.	DEG C	-
CATALYST MAX. TEMP.	DEG C	-

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	257.4	(258.2)
FUEL CONSUMPTION	L/100KM	11.09	(11.18)
HYDROCARBONS (THC)	G/KM	.06	(.06)
CARBON MONOXIDE	G/KM	1.09	(1.09)
OXIDES OF NITROGEN	G/KM	.98	(.97)

PVM - 913 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 91
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-349

TEST NUMBER	913-12	913-13
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	1/ 9/79	1/ 9/79 / /
ODOMETER	7998KM(4968MILES)	7987KM(4962MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	24.4 / 76.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	19.6	16.8
BAROMETER, MM HG(IN HG)	753.1 (29.65)	752.6 (29.63)
RUN TIME, SECONDS	1347	767
BLOWER DIF P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.9 (111.0)	33.9 (111.0)
BLOWER REVOLUTIONS	112295	61630
CVS FLOW STD. CU. METRES(SCF)	213.7 (7548.3)	117.3 (4141.6)
HC SAMPLE METER/RANGE/PPM	16.7/ 2/ 17	12.7/ 2/ 13
HC BCKGRD METER/RANGE/PPM	16.7/ 2/ 17	12.7/ 2/ 13
CO SAMPLE METER/RANGE/PPM	5.9/13/ 5	5.7/13/ 6
CO BCKGRD METER/RANGE/PPM	9.3/13/ 9	5.0/13/ 5
CO2 SAMPLE METER/RANGE/PCT	47.8/ 3/ 1.21	88.3/ 3/ 1.98
CO2 BCKGRD METER/RANGE/PCT	9.1/ 3/ .09	7.7/ 3/ .12
NOX SAMPLE METER/RANGE/PPM	98.6/ 2/ 49	60.2/ 2/ 60
NOX BCKGRD METER/RANGE/PPM	1.7/ 2/ 2	3.2/ 2/ 3
HC CONCENTRATION PPM	2	1
CO CONCENTRATION PPM	1	1
CO2 CONCENTRATION PCT	1.13	1.37
NOX CONCENTRATION PPM	98.1	57.9
HC MASS GRAMS	.14	.09
CO MASS GRAMS	.33	.14
CO2 MASS GRAMS	9913.8	8491.0
NOX MASS GRAMS	19.98	10.31
DFC, WET (DRY)	.909 (.909)	.890 (.890)
SCF, WET (DRY)	1.000 (.989)	1.000 (.986)
VOL (SCM)	213.7	117.3
KM (MEASURED)	22.15	16.62

TEST NUMBER,	PVM-ST	913-12	913-13
BAROMETER,	MM HG	753.1	752.6
HUMIDITY,	G/KG	3.7	3.2
TEMPERATURE,	DEG C	24.4	24.4
TOTAL FUEL SULFUR,	MG/KM	18.23	16.19
AVG. EXH. OXYGEN,	PCT	4.38	5.41
CATALYST AVG. TEMP.,	DEG C	463	500
CATALYST MAX. TEMP.,	DEG C	592	596
CARBON DIOXIDE,	G/KM	199.3	176.9
FUEL CONSUMPTION,	L/100KM	8.51	7.55
HYDROCARBONS,	G/KM	.01	.01
CARBON MONOXIDE,	G/KM	.01	.01
OXIDES OF NITROGEN,	G/KM	.68	.62

TABLE E-8. TEST NO. 413-2 EMISSIONS RESULTS

PVH - 413 FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-4989-001

TEST NO. 413-21 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 1/15/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 7868 KM(4889 MILES)

BAROMETER 749.05 MM HG(29.49 IN HG)
RELATIVE HUMIDITY 13 PCT

DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 2.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .94

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	279.7 (30.5)	279.7 (30.5)	279.7 (30.5)	279.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	44.4 (111.0)	44.3 (110.0)	44.3 (110.0)
BLOWER REVOLUTIONS	40629	69719	40867	69687
CVS FLOW STD. CU. METRES(SCF)	76.8 (2713.6)	131.9 (4660.0)	76.9 (2719.5)	131.8 (4658.6)
HC SAMPLE METER/RANGE/PPM	38.0/ 2/ 38	16.7/ 2/ 17	21.4/ 2/ 21	15.6/ 2/ 16
HC BCKGRD METER/RANGE/PPM	10.1/ 2/ 10	10.0/ 2/ 10	9.5/ 2/ 10	9.3/ 2/ 9
CO SAMPLE METER/RANGE/PPM	81.7/11/ 374	38.5/13/ 34	55.6/12/ 123	41.9/13/ 39
CO BCKGRD METER/RANGE/PPM	2.4/11/ 9	7.8/13/ 8	2.7/12/ 5	5.8/13/ 6
CO2 SAMPLE METER/RANGE/PCT	95.2/ 3/ 1.37	44.8/ 3/ .27	63.0/ 3/ 1.12	44.0/ 3/ .29
CO2 BCKGRD METER/RANGE/PCT	3.4/ 3/ .05	3.4/ 3/ .04	3.5/ 3/ .05	3.4/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	44.4/ 2/ 50	21.8/ 2/ 22	35.1/ 2/ 35	20.6/ 2/ 21
NOX BCKGRD METER/RANGE/PPM	.4/ 2/ 0	.5/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	9.50	17.33	11.78	17.68
HC CONCENTRATION PPM	29	7	15	7
CO CONCENTRATION PPM	359	89	116	33
CO2 CONCENTRATION PCT	1.32	.71	1.07	.70
NOX CONCENTRATION PPM	44.5	21.3	39.6	20.3
HC MASS GRAMS	1.28	.55	.65	.52
CO MASS GRAMS	32.13	9.39	10.36	5.09
CO2 MASS GRAMS	1862.8	1718.9	1811.2	1683.1
NOX MASS GRAMS	5.72	9.23	9.00	9.03
HC GRAMS/KM	.22	.09	.11	.08
CO GRAMS/KM	5.53	.69	1.79	.80
CO2 GRAMS/KM	315.0	270.1	259.5	269.9
NOX GRAMS/KM	.97	.66	.67	.63
FUEL CONSUMPTION AV CR L/100KM	13.89	11.59	10.99	11.37
RUN TIME SECONDS	505	868	509	868
AVG. EXH. OXYGEN PERCENT	9.57	6.99	5.96	6.31
CATALYST AVG. TEMP. DEG. C	550	509	548	-
CATALYST MAX. TEMP. DEG. C	769	576	695	576
MEASURED DISTANCE KM	5.91	6.36	5.99	6.35
DFC, WET (DRY)	.925 (.925)		.933 (.933)	
SCF, WET (DRY)	1.000 (.991)		1.000 (.992)	
VOL (SCM)	208.8		208.9	
KM (MEASURED)	12.28		12.29	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	413-21	TOTAL FUEL SULFUR MG/KM	25.98	CARBON DIOXIDE G/KM	276.1	(273.5)
BAROMETER MM HG	749.0	AVG. EXH. OXYGEN PCT	5.99	FUEL CONSUMPTION L/100KM	11.89	(11.83)
HUMIDITY G/KG	2.9	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.12	(.12)
TEMPERATURE DEG C	23.9	CATALYST MAX. TEMP. DEG C	769	CARBON MONOXIDE G/KM	1.96	(2.00)
				OXIDES OF NITROGEN G/KM	.73	(.78)

PVH - 413 SBT VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-4989-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	413-22	413-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	1/15/79	1/15/79 / /
ODOMETER	7897KM(4907MILES)	7936KM(4931MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	25.0 / 77.0
RELATIVE HUMIDITY, PCT	15.8	12.5
BAROMETER, MM HG(IN HG)	748.8 (29.48)	748.8 (29.48)
RUN TIME, SECONDS	1397	766
BLOWER DIF P MM. H2O(IN. H2O)	279.7 (30.5)	279.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.9 (111.0)	33.3 (110.0)
BLOWER REVOLUTIONS	112189	61609
CVS FLOW STD. CU. METRES(SCF)	212.2 (7496.3)	116.7 (4120.5)
HC SAMPLE METER/RANGE/PPM	20.2/ 2/ 20	19.0/ 2/ 20
HC BCKGRD METER/RANGE/PPM	9.1/ 2/ 9	9.1/ 2/ 9
CO SAMPLE METER/RANGE/PPM	65.2/12/ 196	59.2/12/ 132
CO BCKGRD METER/RANGE/PPM	3.0/12/ 5	4.7/12/ 8
CO2 SAMPLE METER/RANGE/PCT	73.8/ 3/ 1.39	89.5/ 3/ 1.67
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	3.9/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	56.3/ 2/ 66	79.3/ 2/ 79
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.9/ 2/ 1
HC CONCENTRATION PPM	12	12
CO CONCENTRATION PPM	132	120
CO2 CONCENTRATION PCT	1.29	1.62
NOX CONCENTRATION PPM	55.8	78.5
HC MASS GRAMS	1.97	.80
CO MASS GRAMS	33.98	16.30
CO2 MASS GRAMS	5011.9	3965.8
NOX MASS GRAMS	14.03	13.78
DFC, WET (DRY)	.899 (.899)	.879 (.879)
SCF, WET (DRY)	1.000 (.988)	1.000 (.985)
VOL (SCM)	212.2	116.7
KM (MEASURED)	22.27	16.90
TEST NUMBER, PVH-ST	413-22	413-23
BAROMETER, MM HG	748.8	748.8
HUMIDITY, G/KG	2.9	2.5
TEMPERATURE, DEG C	23.9	25.0
TOTAL FUEL SULFUR, MG/KM	20.82	18.91
AVG. EXH. OXYGEN, PCT	5.32	9.22
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	769	787
CARBON DIOXIDE, G/KM	225.1	205.1
FUEL CONSUMPTION, L/100KM	9.72	8.82
HYDROCARBONS, G/KM	.07	.05
CARBON MONOXIDE, G/KM	1.52	.96
OXIDES OF NITROGEN, G/KM	.81	.82

TABLE E-9. TEST NO. 413-2 EMISSIONS RESULTS

PVM - 413 FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-9489-001

TEST NO. 413-31 RUN 1
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 1/16/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399
ODOMETER 7969 KMI(4952 MILES)

BAROMETER 744.51 MM HG(29.39 IN HG)
RELATIVE HUMIDITY 24 PCT
BAG RESULTS

DRY BULB TEMP. 29.4 DEG C(76.0 DEG F)
ABS. HUMIDITY 5.0 GM/KG

NOX HUMIDITY CORRECTION FACTOR .89

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG, C(DEG, F)	45.0 (113.0)	45.0 (113.0)	44.4 (112.0)	44.4 (112.0)
BLOWER REVOLUTIONS	40610	84720	40537	84648
CVS FLOW STD, CU, METRES(SCF)	76.4 (2703.9)	131.9 (4661.8)	76.9 (2697.0)	131.2 (4633.7)
HC SAMPLE METER/RANGE/PPM	33.0/ 2/ 33	16.8/ 2/ 16	22.7/ 2/ 23	16.1/ 2/ 16
HC BCKGRD METER/RANGE/PPM	9.6/ 2/ 10	10.2/ 2/ 10	9.5/ 2/ 10	9.9/ 2/ 10
CO SAMPLE METER/RANGE/PPM	66.8/11/ 279	35.7/13/ 39	99.5/13/ 109	30.7/13/ 34
CO BCKGRD METER/RANGE/PPM	3.7/11/ 11	11.1/13/ 11	3.5/13/ 4	7.8/13/ 8
CO2 SAMPLE METER/RANGE/PCT	73.8/ 3/ 1.39	99.9/ 3/ .77	62.1/ 3/ 1.10	99.1/ 3/ .75
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .04	9.8/ 3/ .04	3.9/ 3/ .04	9.1/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	48.9/ 2/ 98	20.2/ 2/ 20	33.7/ 2/ 34	14.3/ 2/ 14
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	1.8/ 2/ 1	1.8/ 2/ 1	1.3/ 2/ 1
DILUTION FACTOR	9.77	17.30	11.99	17.63
HC CONCENTRATION PPM	24	6	14	7
CO CONCENTRATION PPM	259	23	100	31
CO2 CONCENTRATION PCT	1.69	.71	1.05	.70
NOX CONCENTRATION PPM	43.7	14.1	32.8	18.1
HC MASS GRAMS	1.08	.52	.62	.51
CO MASS GRAMS	23.12	3.52	8.41	4.67
CO2 MASS GRAMS	1807.9	1706.2	1448.3	1670.2
NOX MASS GRAMS	3.87	4.03	4.03	3.81
HC GRAMS/KM	.19	.07	.11	.08
CO GRAMS/KM	3.93	.56	1.53	.75
CO2 GRAMS/KM	307.5	271.2	251.3	268.9
NOX GRAMS/KM	1.00	.64	.69	.61
FUEL CONSUMPTION AT CB L/100KM	13.41	11.62	10.89	11.69
RUN TIME SECONDS	505	868	505	868
AVG. EXH. OXYGEN PERCENT	9.27	6.34	6.39	6.20
CATALYST AVG. TEMP. DEG. C	517	778	-	-
CATALYST MAX. TEMP. DEG. C	713	550	666	594
MEASURED DISTANCE KM	5.88	5.89	5.84	5.81
DFC, WET (DRY)	.926 (.929)		.933 (.932)	
SCF, WET (DRY)	1.000 (.989)		1.000 (.990)	
VOL (SCM)	208.0		207.6	
KM (MEASURED)	12.17		18.06	

COMPOSITE RESULTS

TEST NUMBER	413-31	TOTAL FUEL SULFUR MG/KM	25.25	CARBON DIOXIDE G/KM	3-BAG 273.3	(4-BAG) (272.4)
BAROMETER MM HG	744.5	AVG. EXH. OXYGEN PCT	8.91	FUEL CONSUMPTION L/100KM	11.78	(11.75)
HUMIDITY G/KG	5.0	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.11	(.11)
TEMPERATURE DEG C	29.4	CATALYST MAX. TEMP. DEG C	713	CARBON MONOXIDE G/KM	1.53	(1.58)
				OXIDES OF NITROGEN G/KM	.73	(.72)

PVM - 413 SBT VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-9489-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-399

TEST NUMBER	413-32	413-33
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	1/16/79	1/16/79 / /
ODOMETER	7948KM(4939MILES)	8037KM(4994MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.0 / 77.0	25.6 / 78.0
RELATIVE HUMIDITY, PCT	32.0	33.6
BAROMETER, MM HG(IN HG)	745.0 (29.33)	745.0 (29.33)
RUN TIME, SECONDS	1348	767
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG, C(DEG, F)	44.4 (112.0)	45.0 (113.0)
BLOWER REVOLUTIONS	112217	61561
CVS FLOW STD, CU, METRES(SCF)	210.4 (7444.0)	115.4 (4083.1)
HC SAMPLE METER/RANGE/PPM	20.5/ 2/ 20	21.1/ 2/ 21
HC BCKGRD METER/RANGE/PPM	10.7/ 2/ 11	11.0/ 2/ 11
CO SAMPLE METER/RANGE/PPM	55.8/13/ 129	50.7/13/ 112
CO BCKGRD METER/RANGE/PPM	5.2/13/ 4	6.5/13/ 12
CO2 SAMPLE METER/RANGE/PCT	72.9/ 3/ 1.31	85.9/ 3/ 1.59
CO2 BCKGRD METER/RANGE/PCT	9.0/ 3/ .04	9.3/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	51.9/ 2/ 51	73.9/ 2/ 73
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2	1.5/ 2/ 2
HC CONCENTRATION PPM	11	11
CO CONCENTRATION PPM	111	93
CO2 CONCENTRATION PCT	1.24	1.53
NOX CONCENTRATION PPM	50.0	71.6
HC MASS GRAMS	1.32	.76
CO MASS GRAMS	27.31	13.09
CO2 MASS GRAMS	4858.8	3256.2
NOX MASS GRAMS	17.77	19.18
DFC, WET (DRY)	.901 (.897)	.880 (.876)
SCF, WET (DRY)	1.000 (.996)	1.000 (.981)
VOL (SCM)	210.4	115.9
KM (MEASURED)	21.48	16.65
TEST NUMBER, PVM-	413-32	413-33
BAROMETER, MM HG	744.0	744.0
HUMIDITY, G/KG	6.6	7.0
TEMPERATURE, DEG C	25.0	25.6
TOTAL FUEL SULFUR, MG/KM	28.42	18.02
AVG. EXH. OXYGEN, PCT	5.27	9.98
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	793	793
CARBON DIOXIDE, G/KM	221.1	145.6
FUEL CONSUMPTION, L/100KM	9.53	8.91
HYDROCARBONS, G/KM	.06	.05
CARBON MONOXIDE, G/KM	1.29	.79
OXIDES OF NITROGEN, G/KM	.91	.85

TABLE E-10. TEST NO. 415-1 EMISSIONS RESULTS

PVM - 415 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4484-001

TEST NO. 415-11 RUN 2
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 3/29/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-344
ODOMETER 12390 KM(7699 MILES)

BAROMETER 938.64 MM HG(29.08 IN HG)
RELATIVE HUMIDITY 51 PCT
ABS. HUMIDITY 11.4 GM/KG

DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
NOX HUMIDITY CORRECTION FACTOR 1.02

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H20(IN, H20)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET P MM, H20(IN, H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40496	40641	40546	40599
CVS FLOW STD. CU. METRES(SCF)	75.5 (2668.0)	124.9 (4888.0)	75.6 (2671.3)	124.8 (4589.9)
HC SAMPLE METER/RANGE/PPM	30.9/ 2/ 30	13.3/ 2/ 13	26.0/ 2/ 26	16.8/ 2/ 17
HC BCKGRD METER/RANGE/PPM	13.2/ 2/ 13	13.3/ 2/ 13	14.5/ 2/ 14	16.8/ 2/ 17
CO SAMPLE METER/RANGE/PPM	65.0/11/ 268	9.6/13/ 4	21.9/13/ 21	7.7/13/ 7
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	2.2/13/ 2	1.9/13/ 2	1.8/13/ 2
CO2 SAMPLE METER/RANGE/PCT	68.8/ 3/ 1.24	42.3/ 3/ .72	61.0/ 3/ 1.08	42.1/ 3/ .72
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	3.8/ 3/ .06	3.8/ 3/ .06	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	28.8/ 2/ 29	6.3/ 2/ 6	28.5/ 2/ 28	6.6/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1	.9/ 2/ 1	1.0/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	10.56	18.55	12.32	18.63
HC CONCENTRATION PPM	18	1	13	1
CO CONCENTRATION PPM	255	2	18	4
CO2 CONCENTRATION PCT	1.19	.67	1.03	.66
NOX CONCENTRATION PPM	27.9	5.9	27.4	5.7
HC MASS GRAMS	.80	.05	.55	.07
CO MASS GRAMS	22.49	.36	1.62	.85
CO2 MASS GRAMS	1692.1	1883.2	1425.6	1880.2
NOX MASS GRAMS	4.13	1.34	4.04	1.99
HC GRAMS/KM	.14	.01	.10	.01
CO GRAMS/KM	3.87	.06	.28	.14
CO2 GRAMS/KM	282.7	256.2	245.0	255.6
NOX GRAMS/KM	.71	.22	.70	.23
FUEL CONSUMPTION AV CB L/100KM	12.39	10.99	10.99	10.92
RUN TIME SECONDS	509	868	505	867
AVG. EXH. OXYGEN PERCENT	5.79	7.25	6.19	6.85
CATALYST AVG. TEMP. DEG. C	958	927	921	928
CATALYST MAX. TEMP. DEG. C	978	970	921	982
MEASURED DISTANCE KM	5.81	6.18	5.82	6.18
DFC, WET (DRY)	.931 (.922)		.936 (.927)	
SCF, WET (DRY)	1.000 (.992)		1.000 (.992)	
VOL (SCM)	205.4		205.4	
KM (MEASURED)	11.99		12.00	

COMPOSITE RESULTS

TEST NUMBER		415-11
BAROMETER	MM HG	938.6
HUMIDITY	G/KG	11.4
TEMPERATURE	DEG C	26.7

TOTAL FUEL SULFUR	MG/KM	23.81
AVG. EXH. OXYGEN	PCT	6.40
CATALYST AVG. TEMP.	DEG C	930
CATALYST MAX. TEMP.	DEG C	--

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	258.6	(258.5)
FUEL CONSUMPTION	L/100KM	11.11	(11.10)
HYDROCARBONS (THC)	G/KM	.06	(.06)
CARBON MONOXIDE	G/KM	.41	(.40)
OXIDES OF NITROGEN	G/KM	.96	(.96)

PVM - 415 SET VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4484-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-344

	415-12 SET 2 3/29/79 12326KM(7658MILES) 2 - 1 = 3	415-13 HFET 2 3/29/79 12363KM(7682MILES) 2 - 1 = 3
TEST NUMBER		
TEST CYCLE		
RUN NUMBER		
DATE		/ /
ODOMETER		
CVS - BAG CART - DYNAMOMETER		
TEMPERATURE DEG. C (DEG. F)	27.2 / 81.0	28.3 / 83.0
RELATIVE HUMIDITY, PCT	30.2	33.2
BAROMETER, MM HG(IN HG)	743.2 (29.26)	743.2 (29.26)
RUN TIME, SECONDS	1347	766
BLOWER DIF P MM, H20(IN, H20)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET P MM, H20(IN, H20)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET TEMP, DEG. C(DEG. F)	45.6 (114.0)	44.4 (112.0)
BLOWER REVOLUTIONS	112169	61592
CVS FLOW STD. CU. METRES(SCF)	210.2 (7429.4)	115.2 (4069.2)
HC SAMPLE METER/RANGE/PPM	12.3/ 2/ 12	12.1/ 2/ 12
HC BCKGRD METER/RANGE/PPM	12.3/ 2/ 12	12.1/ 2/ 12
CO SAMPLE METER/RANGE/PPM	9.9/13/ 5	9.0/13/ 5
CO BCKGRD METER/RANGE/PPM	1.5/13/ 1	1.2/13/ 1
CO2 SAMPLE METER/RANGE/PCT	68.8/ 3/ 1.18	81.7/ 3/ 1.50
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .04	4.0/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	39.2/ 2/ 35	52.3/ 2/ 92
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	1.2/ 2/ 1
HC CONCENTRATION PPM	1	1
CO CONCENTRATION PPM	4	4
CO2 CONCENTRATION PCT	1.12	1.45
NOX CONCENTRATION PPM	39.6	51.2
HC MASS GRAMS	.13	.09
CO MASS GRAMS	.42	.44
CO2 MASS GRAMS	9323.7	3054.8
NOX MASS GRAMS	12.36	11.25
DFC, WET (DRY)	.912 (.904)	.888 (.881)
SCF, WET (DRY)	1.000 (.986)	1.000 (.994)
VOL (SCM)	210.2	115.2
KM (MEASURED)	21.98	14.30
TEST NUMBER,	415-12	415-13
BAROMETER, MM HG	743.2	743.2
HUMIDITY, G/KG	6.9	10.6
TEMPERATURE, DEG C	27.2	28.3
TOTAL FUEL SULFUR, MG/KM	18.39	17.17
AVG. EXH. OXYGEN, PCT	5.99	9.25
CATALYST AVG. TEMP., DEG C	946	932
CATALYST MAX. TEMP., DEG C	959	967
CARBON DIOXIDE, G/KM	200.4	187.7
FUEL CONSUMPTION, L/100KM	8.96	8.01
HYDROCARBONS, G/KM	.01	.01
CARBON MONOXIDE, G/KM	.04	.03
OXIDES OF NITROGEN, G/KM	.57	.49

TABLE E-11. TEST NO. 415-2 EMISSIONS RESULTS

PVM - 915 FTP VEHICLE EMISSIONS RESULTS - DISABLED AIR + O2
PROJECT 11-9989-001

TEST NO. 915-21 RUN #
VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

VEHICLE NO. 41
DATE 9/ 8/79
RAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404
ODOMETER 18725 KM(7487 MILES)

BAROMETER 737.62 MM HG(29.04 IN HG)
RELATIVE HUMIDITY 51 PCT

DRY BULB TEMP, 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 9.8 GM/KG

NOX HUMIDITY CORRECTION FACTOR .97

RAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
RAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, HPO(IN, HPO)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)	774.7 (30.5)
BLOWER INLET P MM, HPO(IN, HPO)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	49660	49760	49815	49693
CVS FLOW STD. CU. METRES(SCF)	35.7 (2675.0)	130.8 (4598.1)	35.6 (2671.0)	129.6 (4589.6)
HC SAMPLE METER/RANGE/PPM	23.1/ 3/ 231	10.8/ 3/ 108	15.8/ 3/ 158	11.0/ 3/ 110
HC BCKGRD METER/RANGE/PPM	1.0/ 3/ 10	1.1/ 3/ 11	1.8/ 3/ 18	1.3/ 3/ 13
CO SAMPLE METER/RANGE/PPM	73.2/ 3/ 9042	59.0/ 3/ 1481	95.7/ 3/ 2761	56.0/ 3/ 1393
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 4	.4/ 3/ 4	.3/ 3/ 3	.4/ 3/ 4
CO2 SAMPLE METER/RANGE/PCT	58.2/ 3/ .81	35.0/ 3/ .49	68.6/ 3/ .85	35.0/ 3/ .49
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.9/ 3/ .05	3.1/ 3/ .05	3.9/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	13.1/ 3/ 13	8.3/ 3/ 8	7.8/ 3/ 8	2.2/ 3/ 2
NOX BCKGRD METER/RANGE/PPM	.9/ 3/ 1	1.1/ 3/ 1	1.0/ 3/ 1	1.1/ 3/ 1
DILUTION FACTOR	10.13	18.18	11.93	18.12
HC CONCENTRATION PPM	222	98	147	98
CO CONCENTRATION PPM	3901	1931	2664	1396
CO2 CONCENTRATION PCT	.87	.54	.98	.54
NOX CONCENTRATION PPM	12.3	1.3	6.6	1.2
HC MASS GRAMS	4.70	7.33	6.91	7.32
CO MASS GRAMS	369.03	216.44	239.67	203.91
CO2 MASS GRAMS	1202.4	1279.1	1103.7	1892.7
NOX MASS GRAMS	1.73	.30	.92	.28
HC GRAMS/KM	1.30	1.20	1.18	1.20
CO GRAMS/KM	60.21	35.56	41.03	33.27
CO2 GRAMS/KM	210.4	209.6	193.0	211.4
NOX GRAMS/KM	.30	.05	.16	.05
FUEL CONSUMPTION AT CB L/100KM	13.25	11.58	11.19	11.92
RUN TIME SECONDS	505	869	806	868
AVG. EXH. OXYGEN PERCENT	1.12	1.17	1.38	1.19
CATALYST AVG. TEMP. DEG. C	388	404	382	411
CATALYST MAX. TEMP. DEG. C	466	498	474	498
MEASURED DISTANCE KM	6.71	6.10	5.92	6.11
DFC, WET (DRY)	.929 (.814)		.934 (.826)	
SCF, WET (DRY)	1.000 (.883)		1.000 (.889)	
VOL (SCM)	205.4		205.9	
KM (MEASURED)	11.82		11.83	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	915-21	TOTAL FUEL SULFUR MG/KM	25.21	CARBON DIOXIDE G/KM	205.2	(205.7)
BAROMETER MM HG	737.6	AVG. EXH. OXYGEN PCT	1.19	FUEL CONSUMPTION L/100KM	11.76	(11.79)
HUMIDITY G/KG	9.8	CATALYST AVG. TEMP. DEG C	384	HYDROCARBONS (THC) G/KM	1.28	(1.28)
TEMPERATURE DEG C	23.9	CATALYST MAX. TEMP. DEG C	474	CARBON MONOXIDE G/KM	42.20	(41.52)
				OXIDES OF NITROGEN G/KM	.13	(.13)

PVM - 915 SRT VEHICLE EMISSIONS RESULTS - DISABLED AIR + O2
PROJECT 11-9989-001

VEHICLE MODEL 78 FORD PINTO CAL.
ENGINE 2.3 L(140 CID) L-4

VEHICLE NO. 41
TRANSMISSION A3
GVW 1552 KG(3422 LBS)

TEST WEIGHT 1247 KG(2750 LBS)
ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
GASOLINE EM-3404

TEST NUMBER	915-22	915-23	
TEST CYCLE	SET	HFET	
RUN NUMBER	2	2	
DATE	9/ 8/79	9/ 8/79	/ /
ODOMETER	18725KM(7487MILES)	18775KM(7507MILES)	
CVS - RAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3	
TEMPERATURE DEG. C (DEG. F)	24.1 / 75.0	25.6 / 78.0	
RELATIVE HUMIDITY, PCT	49.8	49.1	
BAROMETER, MM HG(IN HG)	736.6 (29.00)	738.9 (29.09)	
RUN TIME, SECONDS	1348	766	
BLOWER DIF P MM, HPO(IN, HPO)	774.7 (30.5)	774.7 (30.5)	
BLOWER INLET P MM, HPO(IN, HPO)	762.0 (30.0)	762.0 (30.0)	
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	
BLOWER REVOLUTIONS	118139	61514	
CVS FLOW STD. CU. METRES(SCF)	208.5 (7365.0)	119.4 (4218.5)	
HC SAMPLE METER/RANGE/PPM	14.1/ 3/ 141	24.1/ 3/ 241	
HC BCKGRD METER/RANGE/PPM	2.1/ 3/ 21	1.9/ 3/ 19	
CO SAMPLE METER/RANGE/PPM	47.1/ 2/ 3764	89.1/ 2/ 5262	
CO BCKGRD METER/RANGE/PPM	.4/ 2/ 15	.6/ 2/ 19	
CO2 SAMPLE METER/RANGE/PCT	54.4/ 3/ 1.06	94.0/ 3/ 1.35	
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	3.6/ 3/ .06	
NOX SAMPLE METER/RANGE/PPM	12.0/ 2/ 12	19.1/ 2/ 19	
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 2	1.0/ 2/ 1	
HC CONCENTRATION PPM	172	229	
CO CONCENTRATION PPM	3428	5036	
CO2 CONCENTRATION PCT	1.01	1.30	
NOX CONCENTRATION PPM	10.7	13.2	
HC MASS GRAMS	28.71	19.17	
CO MASS GRAMS	832.92	673.85	
CO2 MASS GRAMS	3852.7	2732.4	
NOX MASS GRAMS	4.09	2.76	
DFC, WET (DRY)	.899 (.887)	.860 (.854)	
SCF, WET (DRY)	1.000 (.988)	1.000 (.980)	
VOL (SCM)	208.5	119.4	
KM (MEASURED)	21.41	16.29	
TEST NUMBER, PVM-ST	915-22	915-23	
BAROMETER, MM HG	736.6	738.9	
HUMIDITY, G/KG	9.5	9.0	
TEMPERATURE, DEG C	24.1	25.6	
TOTAL FUEL SULFUR, MG/KM	22.23	21.96	
AVG. EXH. OXYGEN, PCT	-	.19	
CATALYST AVG. TEMP., DEG C	485	540	
CATALYST MAX. TEMP., DEG C	567	576	
CARBON DIOXIDE, G/KM	179.1	167.7	
FUEL CONSUMPTION, L/100KM	10.37	10.06	
HYDROCARBONS, G/KM	.96	.93	
CARBON MONOXIDE, G/KM	38.38	41.39	
OXIDES OF NITROGEN, G/KM	.19	.17	

TABLE E-12. TEST NO. 415-3 EMISSIONS RESULTS

PVM - 415 FTP VEHICLE EMISSIONS RESULTS - DISABLED AIR + O2
PROJECT 11-9486-001

TEST NO. 415-31 RUN 2	VEHICLE NO. 41	TEST WEIGHT 1247 KG(2750 LBS)
VEHICLE MODEL 78 FORD PINTO CAL.	DATE 4/ 3/79	ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
ENGINE 2.3 L(140 CID) L-4	BAG CART NO. 1	GASOLINE EM-3649
TRANSMISSION A3	DYNO NO. 3	ODOMETER 12812 KM(7961 MILES)
GVW 1552 KG(3422 LBS)	CVS NO. 2	

BAROMETER 739.1 MM HG(29.10 IN HG) DRY BULB TEMP. 23.3 DEG C(74.0 DEG F) NOX HUMIDITY CORRECTION FACTOR .98
RELATIVE HUMIDITY 49 PCT ABS. HUMIDITY 10.0 GM/KG

BAG RESULTS	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	42.2 (108.0)	43.3 (110.0)	42.2 (108.0)
BLOWER REVOLUTIONS	40591	69794	40870	69641
CVS FLOW STD. CU. METRES(SCF)	75.8 (2676.5)	130.5 (4607.9)	75.7 (2674.0)	130.3 (4600.6)
HC SAMPLE METER/RANGE/PPM	21.8/ 3/ 218	87.1/ 2/ 87	13.9/ 3/ 139	73.8/ 2/ 74
HC BCKGRD METER/RANGE/PPM	1.1/ 3/ 11	13.6/ 2/ 14	1.7/ 3/ 17	16.7/ 2/ 17
CO SAMPLE METER/RANGE/PPM	67.6/ 2/ 3408	95.3/ 3/ 1095	82.6/ 3/ 2256	93.5/ 3/ 1047
CO BCKGRD METER/RANGE/PPM	.5/ 2/ 19	.8/ 3/ 18	.5/ 3/ 11	.6/ 3/ 14
CO2 SAMPLE METER/RANGE/PCT	55.3/ 3/ .49	36.9/ 3/ .62	50.0/ 3/ .87	37.0/ 3/ .62
CO2 BCKGRD METER/RANGE/PCT	3.3/ 3/ .05	3.5/ 3/ .05	3.0/ 3/ .04	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	7.0/ 2/ 7	9.2/ 2/ 9	5.5/ 2/ 6	8.7/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	1.8/ 2/ 2	2.9/ 2/ 3	2.6/ 2/ 3	2.0/ 2/ 2
DILUTION FACTOR	10.01	18.22	12.20	18.33
HC CONCENTRATION PPM	208	74	118	58
CO CONCENTRATION PPM	3455	1096	2166	1003
CO2 CONCENTRATION PCT	.48	.87	.81	.58
NOX CONCENTRATION PPM	5.6	1.5	3.1	.8
HC MASS GRAMS	9.10	9.59	9.17	9.36
CO MASS GRAMS	309.87	159.89	191.09	152.13
CO2 MASS GRAMS	1283.2	1341.3	1129.5	1373.9
NOX MASS GRAMS	.80	.36	.99	.20
HC GRAMS/KM	1.56	.90	.84	.70
CO GRAMS/KM	52.91	25.68	32.84	24.35
CO2 GRAMS/KM	220.6	220.1	193.3	219.9
NOX GRAMS/KM	.19	.06	.08	.03
FUEL CONSUMPTION AT CB L/100KM	13.19	11.29	10.57	11.12
RUN TIME SECONDS	505	868	505	868
AVG. EXH. OXYGEN PERCENT	1.19	1.91	1.03	1.52
CATALYST AVG. TEMP. DEG. C	308	928	902	953
CATALYST MAX. TEMP. DEG. C	972	984	908	987
MEASURED DISTANCE KM	5.82	6.18	5.82	6.25
DFC, WET (DRY)	.429 (.418)		.435 (.425)	
SCF, WET (DRY)	1.000 (.982)		1.000 (.982)	
VOL (SCM)	206.2		206.0	
KM (MEASURED)	12.00		12.04	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	415-31	TOTAL FUEL SULFUR	MG/KM	29.54	CARBON DIOXIDE	G/KM	212.8 (212.8)
BAROMETER MM HG	739.1	AVG. EXH. OXYGEN	PCT	1.24	FUEL CONSUMPTION	L/100KM	11.95 (11.92)
HUMIDITY G/KG	10.0	CATALYST AVG. TEMP, DEG C		904	HYDROCARBONS (THC)	G/KM	1.09 (.98)
TEMPERATURE DEG C	23.3	CATALYST MAX. TEMP, DEG C		980	CARBON MONOXIDE	G/KM	33.23 (32.83)
					OXIDES OF NITROGEN	G/KM	.08 (.07)

PVM - 415 BST VEHICLE EMISSIONS RESULTS - DISABLED AIR + O2
PROJECT 11-9486-001

VEHICLE MODEL 78 FORD PINTO CAL.	VEHICLE NO. 41	TEST WEIGHT 1247 KG(2750 LBS)
ENGINE 2.3 L(140 CID) L-4	TRANSMISSION A3	ACTUAL ROAD LOAD 8.0 KW(10.7 HP)
	GVW 1552 KG(3422 LBS)	GASOLINE EM-3649

	415-32	415-33
TEST NUMBER		
TEST CYCLE	BST	HFET
RUN NUMBER	2	2
DATE	4/ 3/79	4/ 3/79 / /
ODOMETER	12901KM(8016MILES)	12978KM(8062MILES)
CVS + BAG CART + DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	26.1 / 79.0	25.6 / 78.0
RELATIVE HUMIDITY, PCT	43.8	43.1
BAROMETER, MM HG(IN HG)	738.9 (29.09)	738.9 (29.09)
RUN TIME, SECONDS	1347	766
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	112139	61483
CVS FLOW STD. CU. METRES(SCF)	209.3 (7390.7)	119.7 (4092.1)
HC SAMPLE METER/RANGE/PPM	13.3/ 3/ 133	19.3/ 3/ 193
HC BCKGRD METER/RANGE/PPM	1.8/ 3/ 18	1.6/ 3/ 16
CO SAMPLE METER/RANGE/PPM	59.8/ 2/ 2765	75.9/ 2/ 9269
CO BCKGRD METER/RANGE/PPM	.9/ 2/ 15	.7/ 2/ 27
CO2 SAMPLE METER/RANGE/PCT	58.8/ 3/ 1.09	68.7/ 3/ 1.29
CO2 BCKGRD METER/RANGE/PPM	3.9/ 3/ .05	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	6.2/ 2/ 6	8.6/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.9/ 2/ 1
HC CONCENTRATION PPM	117	179
CO CONCENTRATION PPM	2667	9081
CO2 CONCENTRATION PCT	.99	1.19
NOX CONCENTRATION PPM	5.9	7.8
HC MASS GRAMS	10.09	11.89
CO MASS GRAMS	697.90	995.15
CO2 MASS GRAMS	3802.1	2940.5
NOX MASS GRAMS	2.09	1.69
DFC, WET (DRY)	.402 (.393)	.376 (.364)
SCF, WET (DRY)	1.000 (.983)	1.000 (.981)
VOL (SCM)	209.3	119.7
KM (MEASURED)	21.70	16.97
TEST NUMBER, PVM-ST	415-32	415-33
BAROMETER, MM HG	738.9	738.9
HUMIDITY, G/KG	9.5	9.0
TEMPERATURE, DFG C	26.1	25.6
TOTAL FUEL SULFUR, MG/KM	28.51	18.80
AVG. EXH. OXYGEN, PCT	.81	.83
CATALYST AVG. TEMP., DEG C	909	529
CATALYST MAX. TEMP., DEG C	967	567
CARBON DIOXIDE, G/KM	175.2	151.2
FUEL CONSUMPTION, L/100KM	9.57	8.97
HYDROCARBONS, G/KM	.65	.72
CARBON MONOXIDE, G/KM	29.84	33.10
OXIDES OF NITROGEN, G/KM	.10	.10

TABLE E-13. TEST NO. 421-1 EMISSIONS RESULTS

PVM - 421 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 421-11 RUN 2
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 92
DATE 10/13/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 9696 KM(2918 MILES)

BAROMETER 793.96 MM HG(29.27 IN HG)
RELATIVE HUMIDITY 58 PCT
BAG RESULTS

DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 10.2 GM/KG

NOX HUMIDITY CURRECTION FACTOR .98

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	41.1 (106.0)	42.8 (109.0)	42.2 (108.0)
BLOWER REVOLUTIONS	90856	69779	90593	69821
CVS FLOW STD. CU. METRES(SCF)	77.1 (2721.9)	132.1 (9666.9)	76.6 (2706.9)	131.9 (9659.9)
HC SAMPLE METER/RANGE/PPM	11.8/ 3/ 118	18.8/ 2/ 19	19.1/ 2/ 19	19.2/ 2/ 19
HC BCKGRD METER/RANGE/PPM	1.9/ 3/ 19	18.8/ 2/ 19	15.0/ 2/ 15	19.2/ 2/ 19
CO SAMPLE METER/RANGE/PPM	39.8/ 3/ 821	15.1/13/ 19	95.9/13/ 69	12.0/13/ 11
CO BCKGRD METER/RANGE/PPM	.6/ 3/ 19	7.9/13/ 8	5.1/13/ 5	9.9/13/ 9
CO2 SAMPLE METER/RANGE/PCT	69.8/ 3/ 1.16	92.5/ 3/ .72	58.6/ 3/ 1.09	91.0/ 3/ .70
CO2 BCKGRD METER/RANGE/PCT	9.0/ 3/ .06	9.0/ 3/ .06	9.3/ 3/ .07	9.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	33.5/ 2/ 33	8.0/ 2/ 8	15.7/ 2/ 16	8.8/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.1/ 2/ 1	1.2/ 2/ 1	1.1/ 2/ 1
DILUTION FACTOR	10.72	18.91	12.89	19.17
HC CONCENTRATION PPM	101	1	5	1
CO CONCENTRATION PPM	775	9	57	9
CO2 CONCENTRATION PCT	1.10	.67	.97	.69
NOX CONCENTRATION PPM	32.3	7.8	19.6	7.8
HC MASS GRAMS	9.98	.08	.23	.06
CO MASS GRAMS	64.59	1.09	5.13	1.09
CO2 MASS GRAMS	1557.0	1612.3	1367.2	1591.9
NOX MASS GRAMS	9.68	1.73	2.10	1.42
HC GRAMS/KM	.77	.01	.09	.01
CO GRAMS/KM	11.92	.17	.88	.17
CO2 GRAMS/KM	266.8	257.6	233.8	246.7
NOX GRAMS/KM	.88	.28	.36	.31
FUEL CONSUMPTION BY CB L/100KM	12.29	11.01	10.04	10.59
RUN TIME SECONDS	505	866	505	867
AVG. EXH. OXYGEN PERCENT	1.69	1.11	1.30	1.08
CATALYST AVG. TEMP. DEG. C	221	486	428	509
CATALYST MAX. TEMP. DEG. C	448	506	517	533
MEASURED DISTANCE KM	5.89	6.26	5.85	6.25
DFC, WET (DRY)	.931 (.920)		.938 (.927)	
SCF, WET (DRY)	1.000 (.988)		1.000 (.988)	
VOL (SCM)	209.2		208.6	
KM (MEASURED)	12.10		12.10	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	421-11	TOTAL FUEL SULFUR	MG/KM 23.59	CARBON DIOXIDE	G/KM	253.8	(249.7)
BAROMETER MM HG	793.5	AVG. EXH. OXYGEN	PCT 1.23	FUEL CONSUMPTION	L/100KM	11.01	(10.87)
HUMIDITY G/KG	10.2	CATALYST AVG. TEMP.	DEG C 432	HYDROCARBONS (THC)	G/KM	.18	(.18)
TEMPERATURE DEG C	22.8	CATALYST MAX. TEMP.	DEG C 517	CARBON MONOXIDE	G/KM	2.80	(2.80)
				OXIDES OF NITROGEN	G/KM	.91	(.92)

PVM - 421 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 92
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	421-12	421-13
TEST CYCLE	SET	HFET
RUN NUMBER	2	2
DATE	10/13/78	10/13/78 / /
ODOMETER	9727KM(2937MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	51.3	41.6
BAROMETER, MM HG(IN HG)	793.7 (29.28)	793.7 (29.28)
RUN TIME, SECONDS	1397	766
BLOWER DIF P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.2 (108.0)	42.8 (109.0)
BLOWER REVOLUTIONS	112300	68621
CVS FLOW STD. CU. METRES(SCF)	212.3 (7497.2)	118.3 (4179.6)
HC SAMPLE METER/RANGE/PPM	22.2/ 2/ 22	15.6/ 2/ 16
HC BCKGRD METER/RANGE/PPM	22.2/ 2/ 22	15.6/ 2/ 16
CO SAMPLE METER/RANGE/PPM	68.2/13/ 53	18.2/13/ 17
CO BCKGRD METER/RANGE/PPM	9.1/13/ 9	1.6/13/ 2
CO2 SAMPLE METER/RANGE/PCT	67.0/ 3/ 1.20	78.5/ 3/ 1.44
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06	9.1/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	17.7/ 2/ 18	29.1/ 2/ 29
NOX BCKGRD METER/RANGE/PPM	1.4/ 2/ 1	1.3/ 2/ 1
HC CONCENTRATION PPM	8	8
CO CONCENTRATION PPM	47	15
CO2 CONCENTRATION PCT	1.15	1.38
NOX CONCENTRATION PPM	16.9	22.9
HC MASS GRAMS	.25	.11
CO MASS GRAMS	11.73	2.06
CO2 MASS GRAMS	9966.0	2996.0
NOX MASS GRAMS	6.95	4.78
DFC, WET (DRY)	.910 (.900)	.892 (.886)
SCF, WET (DRY)	1.000 (.979)	1.000 (.980)
VOL (SCM)	212.3	118.3
KM (MEASURED)	21.58	16.50

TEST NUMBER, PVNT	421-12	421-13
BAROMETER, MM HG	793.7	793.7
HUMIDITY, G/KG	9.7	8.1
TEMPERATURE, DEG C	23.9	24.4
TOTAL FUEL SULFUR, MG/KM	19.01	16.63
AVG. EXH. OXYGEN, PCT	1.62	1.56
CATALYST AVG. TEMP., DEG C	551	595
CATALYST MAX. TEMP., DEG C	699	636
CARBON DIOXIDE, G/KM	207.0	181.6
FUEL CONSUMPTION, L/100KM	8.87	7.76
HYDROCARBONS, G/KM	.01	.01
CARBON MONOXIDE, G/KM	.59	.13
OXIDES OF NITROGEN, G/KM	.30	.29

TABLE E-14. TEST NO. 421-2 EMISSIONS RESULTS

PVM - 421 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4989-001

TEST NO. 421-21 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 10/29/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 5095 KM(3166 MILES)

BAROMETER 743.71 MM HG(29.28 IN HG)
RELATIVE HUMIDITY 40 PCT
ABS. HUMIDITY 7.3 GM/KG

NOX HUMIDITY CORRECTION FACTOR .90

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	744.3 (29.5)	744.3 (29.5)	744.3 (29.5)	744.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	40.6 (105.0)	43.3 (110.0)	42.8 (109.0)
BLOWER REVOLUTIONS	40683	69750	41193	69069
CVS FLOW STD. CU. METRES(SCF)	76.8 (2710.9)	132.3 (4671.1)	77.7 (2743.0)	130.9 (4609.6)
HC SAMPLE METER/RANGE/PPM	25.2/ 3/ 252	12.5/ 3/ 125	16.3/ 3/ 163	11.9/ 3/ 119
HC BCKGRD METER/RANGE/PPM	.6/ 3/ 6	.9/ 3/ 9	.8/ 3/ 8	.9/ 3/ 9
CO SAMPLE METER/RANGE/PPM	77.3/ 2/ 9383	84.5/ 3/ 2323	63.9/ 2/ 3387	80.3/ 3/ 2171
CO BCKGRD METER/RANGE/PPM	.9/ 2/ 15	1.9/ 3/ 32	.6/ 2/ 23	1.9/ 3/ 93
CO2 SAMPLE METER/RANGE/PCT	55.0/ 3/ .96	35.1/ 3/ .59	45.8/ 3/ .79	34.7/ 3/ .58
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.7/ 3/ .06	3.5/ 3/ .05	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	20.9/ 2/ 21	1.8/ 2/ 2	3.5/ 2/ 4	1.2/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.9/ 2/ 1	.5/ 2/ 1	.3/ 2/ 0
DILUTION FACTOR	9.98	16.21	11.48	16.67
HC CONCENTRATION PPM	249	117	156	111
CO CONCENTRATION PPM	9231	2237	3813	2074
CO2 CONCENTRATION PCT	.92	.53	.74	.52
NOX CONCENTRATION PPM	20.2	1.8	3.8	.9
HC MASS GRAMS	10.92	8.89	6.47	8.31
CO MASS GRAMS	378.16	399.58	290.54	315.58
CO2 MASS GRAMS	1288.8	1299.1	1099.1	1251.1
NOX MASS GRAMS	8.66	.22	.91	.21
HC GRAMS/KM	1.87	1.92	1.20	1.32
CO GRAMS/KM	64.91	54.89	54.88	50.27
CO2 GRAMS/KM	221.1	286.1	190.1	199.3
NOX GRAMS/KM	.96	.03	.07	.03
FUEL CONSUMPTION AT CB L/100KM	14.04	12.67	11.14	12.84
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	.88	-	1.07	.93
CATALYST AVG. TEMP. DEG. C	178	-	326	907
CATALYST MAX. TEMP. DEG. C	389	931	923	997
MEASURED DISTANCE KM	5.83	6.28	5.82	6.28
DFC, WET (DRY)	.922 (.916)		.931 (.925)	
SCF, WET (DRY)	1.000 (.987)		1.000 (.987)	
VOL (SCM)	209.8		208.0	
KM (MEASURED)	12.10		12.10	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	421-21	TOTAL FUEL SULFUR MG/KM	26.90	CARBON DIOXIDE G/KM	202.1	(200.1)
BAROMETER MM HG	743.7	AVG. EXH. OXYGEN PCT	-	FUEL CONSUMPTION L/100KM	12.55	(12.37)
HUMIDITY G/KG	7.3	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	1.46	(1.42)
TEMPERATURE DEG C	23.3	CATALYST MAX. TEMP. DEG C	931	CARBON MONOXIDE G/KM	55.64	(54.22)
				OXIDES OF NITROGEN G/KM	.13	(.13)

PVM - 421 SBT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	421-22	421-23	
TEST CYCLE	SET	HFET	
RUN NUMBER	1	1	
DATE	10/29/78	10/29/78	/ /
ODOMETER	5126KM(3185MILES)	5163KM(3208MILES)	
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3	
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	23.9 / 75.0	
RELATIVE HUMIDITY, PCT	40.9	40.9	
BAROMETER, MM HG(IN HG)	743.2 (29.26)	743.2 (29.26)	
RUN TIME, SECONDS	1900	765	
BLOWER DIF P MM. H2O(IN. H2O)	744.3 (29.5)	744.3 (29.5)	
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	
BLOWER INLET TEMP. DEG. C(DEG. F)	41.7 (107.0)	43.3 (110.0)	
BLOWER REVOLUTIONS	112179	61480	
CVS FLOW STD. CU. METRES(SCF)	212.1 (7488.7)	116.3 (4107.1)	
HC SAMPLE METER/RANGE/PPM	18.3/ 3/ 183	21.1/ 3/ 211	
HC BCKGRD METER/RANGE/PPM	1.0/ 3/ 10	1.0/ 3/ 10	
CO SAMPLE METER/RANGE/PPM	73.1/ 2/ 9039	85.3/ 2/ 5093	
CO BCKGRD METER/RANGE/PPM	1.6/ 2/ 61	1.2/ 2/ 46	
CO2 SAMPLE METER/RANGE/PCT	56.0/ 3/ .98	69.2/ 3/ 1.25	
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .06	3.8/ 3/ .06	
NOX SAMPLE METER/RANGE/PPM	9.0/ 2/ 9	3.7/ 2/ 4	
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	.8/ 2/ 1	
HC CONCENTRATION PPM	179	202	
CO CONCENTRATION PPM	3850	4865	
CO2 CONCENTRATION PCT	.93	1.20	
NOX CONCENTRATION PPM	3.9	3.0	
HC MASS GRAMS	21.29	13.57	
CO MASS GRAMS	458.81	658.73	
CO2 MASS GRAMS	3601.9	2599.6	
NOX MASS GRAMS	1.29	.61	
DFC, WET (DRY)	.896 (.890)	.869 (.863)	
SCF, WET (DRY)	1.000 (.989)	1.000 (.982)	
VOL (SCM)	212.1	116.3	
KM (MEASURED)	21.86	16.78	
TEST NUMBER, PVM-SBT	421-22	421-23	
BAROMETER, MM HG	743.2	743.2	
HUMIDITY, G/KG	7.7	7.7	
TEMPERATURE, DEG C	23.9	23.9	
TOTAL FUEL SULFUR, MG/KM	21.60	19.87	
AVG. EXH. OXYGEN, PCT	.52	-	
CATALYST AVG. TEMP., DEG C	413	988	
CATALYST MAX. TEMP., DEG C	529	596	
CARBON DIOXIDE, G/KM	164.7	152.7	
FUEL CONSUMPTION, L/100KM	10.08	9.27	
HYDROCARBONS, G/KM	.97	.81	
CARBON MONOXIDE, G/KM	93.94	39.95	
OXIDES OF NITROGEN, G/KM	.06	.09	

TABLE E-15. TEST NO. 421-3 EMISSIONS RESULTS

PVM - 421 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-9489-001

TEST NO. 421-31 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 92
DATE 10/25/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 5837 KM(3624 MILES)

BAROMETER 739.45 MM HG(29.12 IN HG)
RELATIVE HUMIDITY 69 PCT
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 12.9 GM/KG
NOX HUMIDITY CORRECTION FACTOR 1.06

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, H2O(IN, H2O)	799.2 (29.3)	799.2 (29.3)	791.7 (29.2)	799.2 (29.3)
BLOWER INLET P MM, H2O(IN, H2O)	729.0 (28.7)	736.6 (29.0)	731.5 (28.8)	731.5 (28.8)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.9 (111.0)	42.8 (109.0)	39.9 (118.0)	33.3 (110.0)
BLOWER REVOLUTIONS	50637	69718	58588	69601
CVS FLOW STD. CU. METRES(SCF)	76.2 (2691.7)	130.9 (9622.7)	76.2 (2691.9)	130.6 (9618.8)
HC SAMPLE METER/RANGE/PPM	27.2/ 3/ 272	13.8/ 3/ 138	17.5/ 3/ 175	12.7/ 3/ 127
HC BCKGRD METER/RANGE/PPM	2.0/ 3/ 20	1.6/ 3/ 16	1.9/ 3/ 19	1.9/ 3/ 19
CO SAMPLE METER/RANGE/PPM	88.7/ 2/ 9677	91.0/ 3/ 2571	68.6/ 2/ 3629	85.5/ 3/ 2360
CO BCKGRD METER/RANGE/PPM	.5/ 2/ 19	1.9/ 3/ 32	.7/ 2/ 27	1.3/ 3/ 29
CO2 SAMPLE METER/RANGE/PCT	56.1/ 3/ .99	35.7/ 3/ .60	47.9/ 3/ .82	34.1/ 3/ .57
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.8/ 3/ .06	3.6/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	17.1/ 2/ 17	1.5/ 2/ 2	2.2/ 2/ 3	1.3/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.7/ 2/ 1	.8/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	9.17	15.57	11.27	16.59
HC CONCENTRATION PPM	259	123	162	119
CO CONCENTRATION PPM	9967	2955	3515	2255
CO2 CONCENTRATION PCT	.99	.59	.77	.51
NOX CONCENTRATION PPM	16.9	.8	2.5	.7
HC MASS GRAMS	11.17	9.29	7.13	8.58
CO MASS GRAMS	396.93	379.16	311.93	392.88
CO2 MASS GRAMS	1309.3	1303.8	1070.9	1227.3
NOX MASS GRAMS	2.53	.22	.38	.19
HC GRAMS/KM	1.89	1.97	1.23	1.36
CO GRAMS/KM	67.23	59.20	53.80	59.98
CO2 GRAMS/KM	222.0	206.3	184.6	195.0
NOX GRAMS/KM	.43	.03	.07	.03
FUEL CONSUMPTION BY CB L/100KM	14.24	12.47	11.66	12.16
RUN TIME SECONDS	504	867	506	867
AVG. EXH. OXYGEN PERCENT	.77	.48	.82	1.03
CATALYST AVG. TEMP. DEG. C	196	349	347	917
CATALYST MAX. TEMP. DEG. C	363	910	906	923
MEASURED DISTANCE KM	5.90	6.32	5.80	6.29
DFC, WET (DRY)	.919 (.905)		.929 (.919)	
SCF, WET (DRY)	1.000 (.977)		1.000 (.978)	
VOL (SCM)	207.1		204.8	
KM (MEASURED)	12.22		12.09	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER		421-31	TOTAL FUEL SULFUR MG/KM	27.60	CARBON DIOXIDE G/KM	203.7	(200.3)
BAROMETER	MM HG	739.4	AVG. EXH. OXYGEN PCT	.91	FUEL CONSUMPTION L/100KM	12.88	(12.69)
HUMIDITY	G/KG	12.9	CATALYST AVG. TEMP. DEG C	356	HYDROCARBONS (THC) G/KM	1.99	(1.96)
TEMPERATURE	DEG C	22.8	CATALYST MAX. TEMP. DEG C	910	CARBON MONOXIDE G/KM	59.90	(57.99)
					OXIDES OF NITROGEN G/KM	.13	(.12)

PVM - 421 SBT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-9489-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 92
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	421-32	421-33
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	10/25/78	10/25/78 / /
ODOMETER	5261KM(3269MILES)	5288KM(3286MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	23.3 / 73.9
RELATIVE HUMIDITY, PCT	62.9	61.9
BAROMETER, MM HG(IN HG)	739.1 (29.10)	739.1 (29.10)
RUN TIME, SECONDS	1397	766
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	799.3 (29.5)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	731.5 (28.8)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.9 (111.0)	39.9 (112.0)
BLOWER REVOLUTIONS	112273	61889
CVS FLOW STD. CU. METRES(SCF)	210.1 (7919.6)	115.8 (4091.2)
HC SAMPLE METER/RANGE/PPM	18.7/ 3/ 187	22.1/ 3/ 221
HC BCKGRD METER/RANGE/PPM	.9/ 3/ 9	1.1/ 3/ 11
CO SAMPLE METER/RANGE/PPM	76.0/ 2/ 9273	88.5/ 2/ 5395
CO BCKGRD METER/RANGE/PPM	.2/ 2/ 8	.3/ 2/ 11
CO2 SAMPLE METER/RANGE/PCT	55.6/ 3/ .98	68.3/ 3/ 1.23
CO2 BCKGRD METER/RANGE/PCT	2.7/ 3/ .04	3.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	3.1/ 2/ 3	3.3/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.9/ 2/ 1
HC CONCENTRATION PPM	179	211
CO CONCENTRATION PPM	9108	5150
CO2 CONCENTRATION PCT	.98	1.18
NOX CONCENTRATION PPM	2.6	2.5
HC MASS GRAMS	21.68	19.13
CO MASS GRAMS	1002.90	699.66
CO2 MASS GRAMS	3612.8	2809.7
NOX MASS GRAMS	1.07	.57
DFC, WET (DRY)	.895 (.883)	.868 (.856)
SCF, WET (DRY)	1.000 (.977)	1.000 (.978)
VOL (SCM)	210.1	115.8
KM (MEASURED)	21.54	16.72

TEST NUMBER,	PVM-ST	421-32	421-33
BAROMETER,	MM HG	739.1	739.1
HUMIDITY,	G/KG	11.9	11.9
TEMPERATURE,	DEG C	23.9	23.3
TOTAL FUEL SULFUR,	MG/KM	22.27	19.95
AVG. EXH. OXYGEN,	PCT	.98	.85
CATALYST AVG. TEMP.,	DEG C	936	993
CATALYST MAX. TEMP.,	DEG C	912	933
CARBON DIOXIDE,	G/KM	167.3	150.1
FUEL CONSUMPTION,	L/100KM	10.39	9.31
HYDROCARBONS,	G/KM	1.00	.85
CARBON MONOXIDE,	G/KM	46.45	41.55
OXIDES OF NITROGEN,	G/KM	.05	.03

TABLE E-16. TEST NO. 422-1 EMISSIONS RESULTS

PVH - 922 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 922-11 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 12/11/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 6980 KM(4337 MILES)

BAROMETER 751.33 MM HG(29.58 IN HG)
RELATIVE HUMIDITY 15 PCT

DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
ABS. HUMIDITY 3.6 GM/KG

NOX HUMIDITY CORRECTION FACTOR .79

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H20(IN. H20)	760.0 (30.0)	760.0 (30.0)	760.0 (30.0)	760.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.2 (108.0)	41.1 (106.0)	42.8 (109.0)	41.7 (107.0)
BLOWER REVOLUTIONS	90655	89715	90796	89559
CVS FLOW STD. CU. METRES(SCF)	77.7 (2743.8)	133.5 (4714.2)	77.8 (2747.3)	133.8 (4698.5)
HC SAMPLE METER/RANGE/PPM	41.0/ 2/ 91	8.0/ 2/ 8	12.3/ 2/ 12	6.7/ 2/ 7
HC BCKGRD METER/RANGE/PPM	7.7/ 2/ 8	7.3/ 2/ 7	6.9/ 2/ 7	5.8/ 2/ 6
CO SAMPLE METER/RANGE/PPM	29.5/ 3/ 489	13.5/13/ 13	91.9/13/ 90	11.3/13/ 11
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	3.9/13/ 4	3.2/13/ 3	1.5/13/ 1
CO2 SAMPLE METER/RANGE/PCT	65.1/ 3/ 1.16	42.0/ 3/ .72	57.2/ 3/ 1.01	40.8/ 3/ .69
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	3.5/ 3/ .05	3.9/ 3/ .05	3.8/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	60.9/ 2/ 61	12.3/ 2/ 12	26.8/ 2/ 27	12.9/ 2/ 12
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.5/ 2/ 1	.6/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	10.88	18.64	13.23	14.30
HC CONCENTRATION PPM	89	1	4	1
CO CONCENTRATION PPM	468	4	36	4
CO2 CONCENTRATION PCT	1.12	.66	.96	.64
NOX CONCENTRATION PPM	60.9	11.8	26.8	11.9
HC MASS GRAMS	3.76	.08	.27	.09
CO MASS GRAMS	40.99	1.92	3.89	1.99
CO2 MASS GRAMS	1599.1	1623.7	1366.6	1563.5
NOX MASS GRAMS	7.88	2.38	3.88	2.90
HC GRAMS/KM	.99	.01	.06	.01
CO GRAMS/KM	10.32	.23	.55	.23
CO2 GRAMS/KM	378.3	368.3	333.5	350.3
NOX GRAMS/KM	1.81	.38	.63	.38
FUEL CONSUMPTION BY CB L/100KM	12.48	11.13	10.01	10.70
RUN TIME SECONDS	505	867	505	866
AVG. EXH. OXYGEN PERCENT	1.51	1.58	1.32	1.59
CATALYST AVG. TEMP. DEG. C	811	968	884	949
CATALYST MAX. TEMP. DEG. C	927	987	949	917
MEASURED DISTANCE KM	5.85	6.84	5.88	6.85
OFC, WET (DRY)	.932 (.932)		.934 (.934)	
SCF, WET (DRY)	1.000 (.998)		1.000 (.998)	
VOL (SCM)	211.8		210.8	
KM (MEASURED)	12.84		12.10	

COMPOSITE RESULTS

TEST NUMBER	922-11	TOTAL FUEL SULFUR	MG/KM	23.76	CARBON DIOXIDE	G/KM	356.9
BAROMETER	MM HG 751.3	AVG. EXH. OXYGEN	PCT	1.51	FUEL CONSUMPTION	L/100KM	11.08
HUMIDITY	G/KG 2.6	CATALYST AVG. TEMP.	DEG C	811	HYDROCARBONS (THC)	G/KM	.15
TEMPERATURE	DEG C 23.3	CATALYST MAX. TEMP.	DEG C	949	CARBON MONOXIDE	G/KM	2.92
					OXIDES OF NITROGEN	G/KM	.59

	3-BAG	(9-BAG)
CARBON DIOXIDE	356.9	(352.5)
FUEL CONSUMPTION	11.08	(10.96)
HYDROCARBONS (THC)	.15	(.15)
CARBON MONOXIDE	2.92	(2.92)
OXIDES OF NITROGEN	.59	(.59)

PVH - 922 BBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	922-12	922-13
TEST CYCLE	BBT	HFET
RUN NUMBER	1	1
DATE	12/11/78	12/11/78
ODOMETER	0KM(-0MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	24.4 / 76.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	16.7	15.6
BAROMETER, MM HG(IN HG)	753.6 (29.67)	753.6 (29.67)
RUN TIME, SECONDS	1398	765
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (108.0)	41.7 (107.0)
BLOWER REVOLUTIONS	112297	61997
CVS FLOW STD. CU. METRES(SCF)	218.3 (7703.1)	117.9 (4164.4)
HC SAMPLE METER/RANGE/PPM	7.2/ 2/ 7	7.0/ 3/ 70
HC BCKGRD METER/RANGE/PPM	6.5/ 2/ 6	9.8/ 3/ 88
CO SAMPLE METER/RANGE/PPM	21.2/13/ 80	21.5/13/ 80
CO BCKGRD METER/RANGE/PPM	2.5/13/ 2	12.8/13/ 12
CO2 SAMPLE METER/RANGE/PCT	60.5/ 3/ 1.11	78.8/ 3/ 1.84
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	3.9/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	21.2/ 2/ 21	29.3/ 2/ 29
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	1.2/ 2/ 1
HC CONCENTRATION PPM	2	16
CO CONCENTRATION PPM	17	4
CO2 CONCENTRATION PCT	1.06	1.42
NOX CONCENTRATION PPM	20.5	23.2
HC MASS GRAMS	.27	1.19
CO MASS GRAMS	4.34	1.20
CO2 MASS GRAMS	4176.2	2427.9
NOX MASS GRAMS	4.76	4.16
OFC, WET (DRY)	.917 (.917)	.905 (.905)
SCF, WET (DRY)	1.000 (.998)	1.000 (.998)
VOL (SCM)	218.3	117.9
KM (MEASURED)	22.84	16.69
TEST NUMBER,	922-12	922-13
BAROMETER, MM HG	753.6	753.6
HUMIDITY, G/KG	3.2	2.9
TEMPERATURE, DEG C	24.4	23.9
TOTAL FUEL SULFUR, MG/KM	17.39	19.93
AVG. EXH. OXYGEN, PCT	.96	.37
CATALYST AVG. TEMP., DEG C	938	611
CATALYST MAX. TEMP., DEG C	601	627
CARBON DIOXIDE, G/KM	189.0	157.9
FUEL CONSUMPTION, L/100KM	8.88	6.73
HYDROCARBONS, G/KM	.01	.07
CARBON MONOXIDE, G/KM	.20	.07
OXIDES OF NITROGEN, G/KM	.31	.25

TABLE E-17. TEST NO. 422-2 EMISSIONS RESULTS

PVM - 422 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4989-001

TEST NO. 422-21 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 12/19/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 7489 KM(4632 MILES)

BAROMETER 741.93 MM HG(29.19 IN HG)
RELATIVE HUMIDITY 59 PCT
DRY BULB TEMP. 24.9 DEG C(76.8 DEG F)
ABS. HUMIDITY 11.6 GM/KG
NOX HUMIDITY CORRECTION FACTOR 1.03

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	32.2 (108.0)	30.6 (105.0)	30.6 (105.0)	33.3 (110.0)
BLOWER REVOLUTIONS	98660	69799	98566	69611
CVS FLOW STD. CU. METRES(SCF)	76.6 (2705.5)	131.9 (4658.3)	76.7 (2707.3)	130.9 (4622.3)
HC SAMPLE METER/RANGE/PPM	69.3/ 3/ 633	18.3/ 2/ 18	67.3/ 2/ 67	19.9/ 2/ 19
HC BCKGRD METER/RANGE/PPM	1.8/ 3/ 18	19.9/ 2/ 19	15.0/ 2/ 15	19.9/ 2/ 19
CO SAMPLE METER/RANGE/PPM	96.1/ 3/ 1116	59.6/12/ 121	91.9/12/ 823	58.2/12/ 130
CO BCKGRD METER/RANGE/PPM	.6/ 3/ 19	4.0/12/ 7	2.9/12/ 9	2.5/12/ 4
CO2 SAMPLE METER/RANGE/PCT	69.1/ 3/ 1.19	93.2/ 3/ .79	59.2/ 3/ 1.05	93.6/ 3/ .79
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.8/ 3/ .06	3.6/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	31.9/ 2/ 91	5.3/ 2/ 5	19.0/ 2/ 19	5.8/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.1/ 2/ 1	.9/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	18.19	17.89	18.96	17.89
HC CONCENTRATION PPM	417	5	59	6
CO CONCENTRATION PPM	1058	111	810	121
CO2 CONCENTRATION PCT	1.10	.68	1.00	.69
NOX CONCENTRATION PPM	38.3	4.8	13.2	5.2
HC MASS GRAMS	27.26	.36	2.37	.44
CO MASS GRAMS	99.48	16.98	18.75	18.48
CO2 MASS GRAMS	1530.2	1698.6	1398.6	1650.5
NOX MASS GRAMS	4.58	1.11	1.99	1.07
HC GRAMS/KM	4.68	.06	.91	.07
CO GRAMS/KM	16.22	2.75	3.23	2.99
CO2 GRAMS/KM	249.3	267.9	298.8	267.1
NOX GRAMS/KM	.74	.18	.34	.17
FUEL CONSUMPTION BY CB L/100KM	13.88	11.61	10.55	11.61
RUN TIME SECONDS	505	867	505	866
AVG. EXH. OXYGEN PERCENT	2.63	1.63	1.98	1.62
CATALYST AVG. TEMP. DEG. C	286	612	519	628
CATALYST MAX. TEMP. DEG. C	586	631	639	652
MEASURED DISTANCE KM	5.82	6.16	5.81	6.18
DFC, WET (DRY)	.928 (.917)		.935 (.923)	
SCF, WET (DRY)	1.000 (.979)		1.000 (.979)	
VOL (SCM)	208.5		207.5	
KM (MEASURED)	11.98		11.99	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	422-21	TOTAL FUEL SULFUR MG/KM	29.87	CARBON DIOXIDE G/KM		259.9	(259.3)
BAROMETER MM HG	741.9	AVG. EXH. OXYGEN PCT	1.76	FUEL CONSUMPTION L/100KM		11.61	(11.61)
HUMIDITY G/KG	11.6	CATALYST AVG. TEMP. DEG C	541	HYDROCARBONS (THC) G/KM		1.18	(1.12)
TEMPERATURE DEG C	24.9	CATALYST MAX. TEMP. DEG C	639	CARBON MONOXIDE G/KM		5.78	(5.77)
				OXIDES OF NITROGEN G/KM		.38	(.38)

PVM - 422 SBT VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-4989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	422-22	422-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	12/19/78	12/19/78 / /
ODOMETER	7508KM(4665MILES)	7525KM(4676MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.6 / 78.0	25.6 / 78.0
RELATIVE HUMIDITY, PCT	44.7	44.7
BAROMETER, MM HG(IN HG)	741.2 (29.18)	741.2 (29.18)
RUN TIME, SECONDS	1398	766
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	112239	61608
CVS FLOW STD. CU. METRES(SCF)	210.9 (7449.6)	115.8 (4089.5)
HC SAMPLE METER/RANGE/PPM	57.7/ 2/ 58	97.2/ 2/ 97
HC BCKGRD METER/RANGE/PPM	11.4/ 2/ 11	11.9/ 2/ 12
CO SAMPLE METER/RANGE/PPM	93.0/11/ 388	93.1/11/ 389
CO BCKGRD METER/RANGE/PPM	1.5/11/ 5	1.8/11/ 6
CO2 SAMPLE METER/RANGE/PCT	71.5/ 3/ 1.29	86.8/ 3/ 1.61
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06	4.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	6.7/ 2/ 7	5.5/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.9/ 2/ 1
HC CONCENTRATION PPM	97	37
CO CONCENTRATION PPM	368	366
CO2 CONCENTRATION PCT	1.29	1.56
NOX CONCENTRATION PPM	5.9	4.7
HC MASS GRAMS	5.77	2.44
CO MASS GRAMS	48.58	44.37
CO2 MASS GRAMS	4787.7	3382.9
NOX MASS GRAMS	2.35	1.03
DFC, WET (DRY)	.908 (.898)	.877 (.868)
SCF, WET (DRY)	1.000 (.978)	1.000 (.976)
VOL (SCM)	210.9	115.8
KM (MEASURED)	21.90	10.81
TEST NUMBER, PVM-ST	422-22	422-23
BAROMETER, MM HG	741.2	741.2
HUMIDITY, G/KG	10.9	10.9
TEMPERATURE, DEG C	25.6	25.6
TOTAL FUEL SULFUR, MG/KM	28.46	18.99
AVG. EXH. OXYGEN, PCT	1.83	.94
CATALYST AVG. TEMP., DEG C	683	-18
CATALYST MAX. TEMP., DEG C	793	-18
CARBON DIOXIDE, G/KM	218.6	194.5
FUEL CONSUMPTION, L/100KM	9.49	8.60
HYDROCARBONS, G/KM	.26	.15
CARBON MONOXIDE, G/KM	4.13	2.99
OXIDES OF NITROGEN, G/KM	.11	.06

TABLE E-18. TEST NO. 422-3 EMISSIONS RESULTS

PVM - 922 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-9484-001

TEST NO. 922-31 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 92
DATE 12/20/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394
ODOMETER 7553 KM(4693 MILES)

BAROMETER 738.12 MM HG(29.06 IN HG)
RELATIVE HUMIDITY 48 PCT

DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
ABS. HUMIDITY 12.2 GM/KG

NOX HUMIDITY CORRECTION FACTOR 1.05

BAG RESULTS

	1	2	3	4
BAG NUMBER				
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H20(IN. H20)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	40.2 (108.0)	41.1 (106.0)	44.9 (112.0)	43.3 (110.0)
BLOWER REVOLUTIONS	487**	49663	50519	49833
CVS FLOW STD. CU. METRES(SCF)	76.9 (2697.9)	130.9 (4681.7)	75.7 (2672.0)	130.3 (4601.1)
HC SAMPLE METER/RANGE/PPM	61.0/ 3/ 618	22.9/ 2/ 23	39.9/ 2/ 40	15.6/ 2/ 16
HC BCKGRD METER/RANGE/PPM	2.9/ 3/ 34	22.9/ 2/ 23	18.3/ 2/ 18	15.6/ 2/ 16
CO SAMPLE METER/RANGE/PPM	37.1/ 3/ 880	38.3/12/ 92	58.8/12/ 131	28.2/12/ 59
CO BCKGRD METER/RANGE/PPM	1.6/ 3/ 36	15.1/12/ 29	4.5/12/ 10	4.9/12/ 12
CO2 SAMPLE METER/RANGE/PCT	57.9/ 3/ 1.01	91.1/ 3/ .70	64.0/ 3/ .48	91.6/ 3/ .71
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	4.7/ 3/ .07	6.0/ 3/ .09	5.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	33.5/ 2/ 33	8.0/ 2/ 8	13.1/ 2/ 13	8.7/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	2.0/ 2/ 2	2.1/ 2/ 2	2.1/ 2/ 2	1.8/ 2/ 2
DILUTION FACTOR	11.58	18.91	13.39	18.75
HC CONCENTRATION PPM	588	1	23	1
CO CONCENTRATION PPM	813	53	110	95
CO2 CONCENTRATION PCT	.95	.63	.90	.62
NOX CONCENTRATION PPM	31.7	6.8	11.8	7.0
HC MASS GRAMS	26.91	.09	1.00	.06
CO MASS GRAMS	78.33	8.03	4.78	6.85
CO2 MASS GRAMS	1338.5	1504.1	1299.9	1488.3
NOX MASS GRAMS	4.84	1.58	1.78	1.83
HC GRAMS/KM	4.51	.01	.17	.01
CO GRAMS/KM	12.58	1.20	1.66	1.10
CO2 GRAMS/KM	231.9	241.1	213.1	237.9
NOX GRAMS/KM	.85	.25	.29	.29
FUEL CONSUMPTION BY CB L/100KM	11.33	10.38	9.93	10.21
RUN TIME SECONDS	506	867	504	867
AVG. EXH. OXYGEN PERCENT	2.51	.67	.87	.62
CATALYST AVG. TEMP. DEG. C	-	479	492	578
CATALYST MAX. TEMP. DEG. C	-	593	597	619
MEASURED DISTANCE KM	5.75	6.26	5.89	6.29
DFC, WET (DRY)	.935 (.923)		.939 (.927)	
SCF, WET (DRY)	1.000 (.988)		1.000 (.988)	
VOL (SCM)	207.2		205.9	
KM (MEASURED)	12.01		12.08	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	922-31	TOTAL FUEL SULFUR	MG/KM	21.99	CARBON DIOXIDE	G/KM	231.9	(238.3)
BAROMETER	MM HG 738.1	AVG. EXH. OXYGEN	PCT	1.01	FUEL CONSUMPTION	L/100KM	10.26	(10.21)
HUMIDITY	G/KG 12.2	CATALYST AVG. TEMP.	DEG C	-	HYDROCARBONS (THC)	G/KM	.08	(.08)
TEMPERATURE	DEG C 25.0	CATALYST MAX. TEMP.	DEG C	597	CARBON MONOXIDE	G/KM	3.71	(3.66)
					OXIDES OF NITROGEN	G/KM	.39	(.40)

PVM - 922 SBT VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-9484-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 92
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394

TEST NUMBER		922-32	922-33
TEST CYCLE		SBT	HFET
RUN NUMBER		1	1
DATE		12/20/78	12/20/78 / /
ODOMETER		0KM(-0MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER		2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)		24.7 / 80.0	24.1 / 79.0
RELATIVE HUMIDITY, PCT		49.5	47.0
BAROMETER, MM HG(IN HG)		738.1 (29.06)	738.1 (29.06)
RUN TIME, SECONDS		1399	766
BLOWER DIF P MM. H20(IN. H20)		799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H20(IN. H20)		736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)		43.9 (111.0)	43.9 (111.0)
BLOWER REVOLUTIONS		112963	61991
CVS FLOW STD. CU. METRES(SCF)		210.0 (7417.5)	115.1 (4066.0)
HC SAMPLE METER/RANGE/PPM		53.9/ 2/ 91	50.7/ 2/ 91
HC BCKGRD METER/RANGE/PPM		11.4/ 2/ 12	8.4/ 2/ 8
CO SAMPLE METER/RANGE/PPM		62.9/11/ 286	80.5/11/ 370
CO BCKGRD METER/RANGE/PPM		3.0/11/ 9	1.9/11/ 5
CO2 SAMPLE METER/RANGE/PCT		67.0/ 3/ 1.20	81.2/ 3/ 1.44
CO2 BCKGRD METER/RANGE/PCT		5.4/ 3/ .09	5.5/ 3/ .07
NOX SAMPLE METER/RANGE/PPM		5.7/ 2/ 6	3.6/ 2/ 4
NOX BCKGRD METER/RANGE/PPM		1.5/ 2/ 2	1.1/ 2/ 1
HC CONCENTRATION PPM		93	93
CO CONCENTRATION PPM		238	350
CO2 CONCENTRATION PCT		1.12	1.43
NOX CONCENTRATION PPM		4.3	2.6
HC MASS GRAMS		5.22	2.82
CO MASS GRAMS		58.32	46.89
CO2 MASS GRAMS		4304.9	3021.8
NOX MASS GRAMS		1.76	.69
DFC, WET (DRY)		.908 (.901)	.885 (.878)
SCF, WET (DRY)		1.000 (.991)	1.000 (.993)
VOL (SCM)		210.0	115.1
KM (MEASURED)		22.12	16.73
TEST NUMBER,	PVM-SBT	922-32	922-33
BAROMETER,	MM HG	738.1	738.1
HUMIDITY,	G/KG	10.0	10.2
TEMPERATURE,	DEG C	24.7	24.1
TOTAL FUEL SULFUR,	MG/KM	18.27	16.48
AVG. EXH. OXYGEN,	PCT	.33	.13
CATALYST AVG. TEMP.,	DEG C	577	711
CATALYST MAX. TEMP.,	DEG C	747	746
CARBON DIOXIDE,	G/KM	199.9	180.6
FUEL CONSUMPTION,	L/100KM	9.53	7.92
HYDROCARBONS,	G/KM	.29	.17
CARBON MONOXIDE,	G/KM	2.64	2.80
OXIDES OF NITROGEN,	G/KM	.08	.03

TABLE E-19. TEST NO. 423-1 EMISSIONS RESULTS

PVM - 423 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 423-11 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 1/17/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-349
ODOMETER 9605 KM(5968 MILES)

BAROMETER 745.2 MM HG(29.34 IN HG)
RELATIVE HUMIDITY 50 PCT
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
ABS. HUMIDITY 10.8 GM/KG
NOX HUMIDITY CORRECTION FACTOR 1.00

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	45.0 (113.0)	43.3 (110.0)	44.4 (112.0)	43.3 (110.0)
BLOWER REVOLUTIONS	98891	69698	98582	69679
CVS FLOW STD. CU. METRES(SCF)	76.4 (2708.8)	131.5 (9295.7)	76.9 (2699.9)	131.5 (9299.0)
HC SAMPLE METER/RANGE/PPM	42.7/ 2/ 93	12.5/ 2/ 13	15.5/ 2/ 15	12.3/ 2/ 12
HC BCKGRD METER/RANGE/PPM	12.6/ 2/ 13	12.5/ 2/ 13	12.7/ 2/ 13	13.0/ 2/ 13
CO SAMPLE METER/RANGE/PPM	33.0/ 3/ 776	44.4/13/ 93	82.6/13/ 82	44.7/13/ 93
CO BCKGRD METER/RANGE/PPM	.5/ 3/ 11	11.3/13/ 11	8.4/13/ 8	8.1/13/ 8
CO2 SAMPLE METER/RANGE/PCT	43.8/ 3/ 1.19	91.2/ 3/ .78	84.3/ 3/ .99	90.9/ 3/ .69
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	9.3/ 3/ .07	9.4/ 3/ .07	9.3/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	37.9/ 2/ 38	9.9/ 2/ 9	15.9/ 2/ 15	9.9/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.1/ 2/ 1	.9/ 2/ 1	1.0/ 2/ 1
DILUTION FACTOR	10.96	10.99	13.91	10.91
HC CONCENTRATION PPM	81	1	9	0
CO CONCENTRATION PPM	736	31	72	34
CO2 CONCENTRATION PCT	1.09	.69	.93	.62
NOX CONCENTRATION PPM	36.9	8.9	15.6	8.5
HC MASS GRAMS	3.59	.05	.17	.08
CO MASS GRAMS	65.67	4.78	4.91	5.18
CO2 MASS GRAMS	1523.5	1538.6	1298.8	1999.8
NOX MASS GRAMS	4.92	2.11	2.19	2.13
HC GRAMS/KM	.68	.01	.03	.00
CO GRAMS/KM	11.91	.77	1.11	.83
CO2 GRAMS/KM	249.7	247.9	208.5	291.5
NOX GRAMS/KM	.99	.39	.37	.39
FUEL CONSUMPTION BY CB L/100KM	12.15	10.61	9.78	10.36
RUN TIME SECONDS	505	868	505	868
AVG. EXH. OXYGEN PERCENT	1.57	2.10	1.63	1.99
CATALYST AVG. TEMP. DEG. C	213	956	918	983
CATALYST MAX. TEMP. DEG. C	927	987	949	512
MEASURED DISTANCE KM	5.76	6.21	5.76	6.21
DFC, WET (DRY)	.933 (.929)		.990 (.931)	
SCF, WET (DRY)	1.000 (.992)		1.000 (.989)	
VOL (SCM)	208.1		207.9	
KM (MEASURED)	11.96		11.96	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER		423-11	TOTAL FUEL SULFUR MG/KM	22.89	CARBON DIOXIDE G/KM	295.8 (293.2)
BAROMETER	MM HG	745.2	AVG. EXH. OXYGEN PCT	1.92	FUEL CONSUMPTION L/100KM	10.48 (10.61)
HUMIDITY	G/KG	10.8	CATALYST AVG. TEMP. DEG C	918	HYDROCARBONS (THC) G/KM	.19 (.19)
TEMPERATURE	DEG C	26.1	CATALYST MAX. TEMP. DEG C	949	CARBON MONOXIDE G/KM	3.07 (3.08)
					OXIDES OF NITROGEN G/KM	.97 (.97)

PVM - 423 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-349

	423-12	423-13
TEST NUMBER	SBT	HFET
TEST CYCLE	1	1
RUN NUMBER	1/17/79	1/17/79 / /
DATE	9561KM(5941MILES)	9601KM(5965MILES)
ODOMETER	2 - 1 - 3	2 - 1 - 3
CVS - BAG CART - DYNAMOMETER		
TEMPERATURE DEG. C (DEG. F)	27.8 / 82.0	27.8 / 82.0
RELATIVE HUMIDITY, PCT	76.1	76.1
BAROMETER, MM HG(IN HG)	749.3 (29.32)	749.3 (29.32)
RUN TIME, SECONDS	1398	766
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	43.9 (111.0)
BLOWER REVOLUTIONS	112859	61949
CVS FLOW STD. CU. METRES(SCF)	211.5 (7469.9)	115.9 (4092.1)
HC SAMPLE METER/RANGE/PPM	15.0/ 2/ 15	14.5/ 2/ 14
HC BCKGRD METER/RANGE/PPM	12.8/ 2/ 13	14.5/ 2/ 14
CO SAMPLE METER/RANGE/PPM	89.6/13/ 85	73.9/13/ 73
CO BCKGRD METER/RANGE/PPM	9.5/13/ 9	28.2/13/ 27
CO2 SAMPLE METER/RANGE/PCT	85.7/ 3/ 1.18	74.5/ 3/ 1.48
CO2 BCKGRD METER/RANGE/PCT	9.3/ 3/ .06	9.3/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	17.9/ 2/ 18	22.5/ 2/ 23
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1	1.0/ 2/ 1
HC CONCENTRATION PPM	3	4
CO CONCENTRATION PPM	77	96
CO2 CONCENTRATION PCT	1.13	1.39
NOX CONCENTRATION PPM	17.8	21.9
HC MASS GRAMS	.91	.10
CO MASS GRAMS	18.88	6.19
CO2 MASS GRAMS	4358.3	2834.9
NOX MASS GRAMS	4.16	4.33
DFC, WET (DRY)	.911 (.895)	.895 (.879)
SCF, WET (DRY)	1.000 (.971)	1.000 (.964)
VOL (SCM)	211.5	115.9
KM (MEASURED)	22.01	16.68

TEST NUMBER,	PVM-SBT	423-12	423-13
BAROMETER,	MM HG	749.3	749.3
HUMIDITY,	G/KG	10.3	10.3
TEMPERATURE,	DEG C	27.8	27.8
TOTAL FUEL SULFUR,	MG/KM	18.84	15.43
AVG. EXH. OXYGEN,	PCT	1.10	.95
CATALYST AVG. TEMP..	DEG C	532	602
CATALYST MAX. TEMP..	DEG C	618	634
CARBON DIOXIDE,	G/KM	198.0	178.2
FUEL CONSUMPTION,	L/100KM	8.51	7.29
HYDROCARBONS,	G/KM	.02	.01
CARBON MONOXIDE,	G/KM	.84	.37
OXIDES OF NITROGEN,	G/KM	.42	.38

TABLE E-20. TEST NO. 423-2 EMISSIONS RESULTS

PVM - 423 FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-79884-001

TEST NO. 423-81 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 1/19/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-3404
ODOMETER 9423 KM(6168 MILES)

BAROMETER 736.84 MM HG(29.01 IN HG)
RELATIVE HUMIDITY 58 PCT

DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
ABS. HUMIDITY 15.6 GM/KG

NOX HUMIDITY CORRECTION FACTOR 1.08

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	40636	64641	40528	64619
CVS FLOW STD. CU. METRES(SCF)	75.9 (2679.8)	130.1 (4594.2)	75.6 (2671.8)	129.9 (4589.0)
HC SAMPLE METER/RANGE/PPM	87.6/ 3/ 876	12.1/ 3/ 121	16.5/ 3/ 165	11.9/ 3/ 119
HC BCKGRD METER/RANGE/PPM	1.6/ 3/ 16	1.6/ 3/ 16	1.6/ 3/ 16	1.9/ 3/ 19
CO SAMPLE METER/RANGE/PPM	66.8/ 1/ 9618	84.8/ 3/ 2339	99.3/ 1/ 9551	80.2/ 3/ 2167
CO BCKGRD METER/RANGE/PPM	.9/ 1/ 22	1.3/ 3/ 29	.9/ 1/ 22	1.4/ 3/ 32
CO2 SAMPLE METER/RANGE/PCT	54.5/ 3/ .45	33.8/ 3/ .56	98.3/ 3/ .83	33.3/ 3/ .55
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	4.8/ 3/ .07	4.6/ 3/ .07	4.5/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	80.9/ 8/ 80	2.3/ 2/ 2	3.8/ 2/ 4	2.2/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	2.3/ 2/ 2	1.7/ 2/ 2	1.6/ 2/ 2	1.5/ 2/ 2
DILUTION FACTOR	9.20	16.70	11.28	17.29
HC CONCENTRATION PPM	262	106	150	101
CO CONCENTRATION PPM	9719	2238	3908	2075
CO2 CONCENTRATION PCT	.90	.49	.77	.49
NOX CONCENTRATION PPM	10.3	.7	2.3	.8
HC MASS GRAMS	11.95	7.98	6.56	7.58
CO MASS GRAMS	436.72	339.05	300.23	313.90
CO2 MASS GRAMS	1295.4	1177.9	1066.7	1166.2
NOX MASS GRAMS	2.88	.19	.37	.21
HC GRAMS/KM	1.95	1.27	1.13	1.23
CO GRAMS/KM	70.89	59.21	51.67	50.75
CO2 GRAMS/KM	211.7	188.3	183.6	188.9
NOX GRAMS/KM	.99	.03	.06	.03
FUEL CONSUMPTION AT CF L/100KM	19.05	11.88	11.98	11.61
RUN TIME SECONDS	505	868	504	867
AVG. EXH. OXYGEN PERCENT	1.99	2.36	1.79	2.29
CATALYST AVG. TEMP. DEG. C	147	393	351	-
CATALYST MAX. TEMP. DEG. C	387	918	923	936
MEASURED DISTANCE KM	5.88	6.25	5.81	6.18
DFC, WET (DRY)	.922 (.911)		.931 (.919)	
SCF, WET (DRY)	1.000 (.981)		1.000 (.982)	
VOL (SCM)	209.9		208.6	
KM (MEASURED)	12.13		11.99	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	423-21	TOTAL FUEL SULFUR MG/KM	26.19	CARBON DIOXIDE G/KM	191.9	(191.9)
BAROMETER MM HG	736.9	AVG. EXH. OXYGEN PCT	2.10	FUEL CONSUMPTION L/100KM	12.20	(12.13)
HUMIDITY G/KG	13.0	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	1.37	(1.36)
TEMPERATURE DEG C	26.7	CATALYST MAX. TEMP. DEG C	923	CARBON MONOXIDE G/KM	56.99	(55.97)
				OXIDES OF NITROGEN G/KM	.19	(.19)

PVM - 423 SBT VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-79884-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-3404

TEST NUMBER	423-22	423-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	1/19/79	1/19/79 / /
ODOMETER	9552KM(6184MILES)	9698KM(6284MILES)
CVS,- BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	26.7 / 80.0	27.8 / 82.0
RELATIVE HUMIDITY, PCT	59.2	42.7
BAROMETER, MM HG(IN HG)	735.6 (28.96)	735.6 (28.96)
RUN TIME, SECONDS	1347	766
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	112231	61563
CVS FLOW STD. CU. METRES(SCF)	209.1 (7385.9)	114.7 (4050.8)
HC SAMPLE METER/RANGE/PPM	17.8/ 3/ 178	20.2/ 3/ 202
HC BCKGRD METER/RANGE/PPM	2.2/ 3/ 22	2.0/ 3/ 20
CO SAMPLE METER/RANGE/PPM	44.7/ 1/ 4142	55.8/ 1/ 5008
CO BCKGRD METER/RANGE/PPM	.7/ 1/ 39	.9/ 1/ 51
CO2 SAMPLE METER/RANGE/PCT	93.9/ 3/ .44	58.5/ 3/ 1.03
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	4.8/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	3.4/ 2/ 4	9.9/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	1.2/ 2/ 1
HC CONCENTRATION PPM	159	189
CO CONCENTRATION PPM	4008	4740
CO2 CONCENTRATION PCT	.88	.97
NOX CONCENTRATION PPM	2.9	2.3
HC MASS GRAMS	14.08	12.19
CO MASS GRAMS	475.86	439.67
CO2 MASS GRAMS	3382.6	2091.5
NOX MASS GRAMS	1.02	.51
DFC, WET (DRY)	.898 (.888)	.885 (.879)
SCF, WET (DRY)	1.000 (.980)	1.000 (.983)
VOL (SCM)	208.1	114.7
KM (MEASURED)	21.99	16.91

TEST NUMBER,	PVM-87	423-22	423-23
BAROMETER,	MM HG	735.6	735.6
HUMIDITY,	G/KG	12.3	10.3
TEMPERATURE,	DEG C	26.7	27.8
TOTAL FUEL SULFUR,	MG/KM	20.39	16.88
AVG. EXH. OXYGEN,	PCT	1.90	.51
CATALYST AVG. TEMP.,	DEG C	470	506
CATALYST MAX. TEMP.,	DEG C	525	592
CARBON DIOXIDE,	G/KM	159.2	122.1
FUEL CONSUMPTION,	L/100KM	9.58	7.08
HYDROCARBONS,	G/KM	.87	.73
CARBON MONOXIDE,	G/KM	44.97	38.27
OXIDES OF NITROGEN,	G/KM	.05	.03

TABLE E-21. TEST NO. 423-3 EMISSIONS RESULTS

PVM - 423 FTP VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-9989-001

TEST NO. 989-31 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 1/23/79
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 10073 KM(6259 MILES)

BAROMETER 738.12 MM HG(29.06 IN HG)
RELATIVE HUMIDITY 17 PCT
DRY BULB TEMP. 29.4 DEG C(76.0 DEG F)
ABS. HUMIDITY 3.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .81

BAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	40.6 (105.0)	42.2 (108.0)	40.6 (105.0)
BLOWER REVOLUTIONS	90662	64709	90561	64939
CVS FLOW STD. CU. METRES(SCF)	76.1 (2687.1)	181.1 (9629.5)	76.0 (2685.5)	180.9 (9629.3)
HC SAMPLE METER/RANGE/PPM	28.5/ 3/ 285	11.7/ 3/ 117	15.8/ 3/ 158	11.6/ 3/ 116
HC BCKGRD METER/RANGE/PPM	.6/ 3/ 6	.7/ 3/ 7	.8/ 3/ 8	.7/ 3/ 7
CO SAMPLE METER/RANGE/PPM	83.1/ 2/ 9892	99.9/ 2/ 2388	65.6/ 2/ 3952	99.8/ 2/ 2382
CO BCKGRD METER/RANGE/PPM	.2/ 2/ 8	.3/ 2/ 11	.3/ 2/ 11	.2/ 2/ 8
CO2 SAMPLE METER/RANGE/PCT	54.0/ 3/ .99	33.1/ 3/ .55	44.6/ 3/ .76	33.0/ 3/ .54
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .09	3.0/ 3/ .05	3.6/ 3/ .05	2.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	27.9/ 2/ 28	2.1/ 2/ 2	6.3/ 2/ 6	2.2/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ 0	.3/ 2/ 0	.9/ 2/ 0	.3/ 2/ 0
DILUTION FACTOR	9.29	16.80	11.99	16.55
HC CONCENTRATION PPM	280	110	151	109
CO CONCENTRATION PPM	9769	2936	3368	2333
CO2 CONCENTRATION PCT	.91	.51	.71	.52
NOX CONCENTRATION PPM	27.6	1.8	5.9	1.9
HC MASS GRAMS	12.27	8.35	6.61	8.26
CO MASS GRAMS	922.98	356.61	248.29	355.79
CO2 MASS GRAMS	1269.1	1219.6	995.3	1282.8
NOX MASS GRAMS	3.29	.37	.70	.39
HC GRAMS/KM	2.08	1.33	1.13	1.32
CO GRAMS/KM	71.57	56.69	50.81	56.80
CO2 GRAMS/KM	219.0	193.9	169.6	199.9
NOX GRAMS/KM	.55	.06	.12	.06
FUEL CONSUMPTION BY CB L/100KM	14.21	12.26	10.80	12.58
RUN TIME SECONDS	505	867	505	867
AVG. EXH. OXYGEN PERCENT	1.07	1.69	1.29	1.61
CATALYST AVG. TEMP. DEG. C	190	399	318	390
CATALYST MAX. TEMP. DEG. C	388	983	343	919
MEASURED DISTANCE KM	5.90	6.24	5.87	6.26
DFC, WET (DRY)	.923 (.923)		.931 (.931)	
SCF, WET (DRY)	1.000 (.999)		1.000 (.999)	
VOL (SCM)	207.2		207.0	
KM (MEASURED)	12.19		12.13	

COMPOSITE RESULTS

TEST NUMBER		423-31
BAROMETER	MM HG	738.1
HUMIDITY	G/KG	3.9
TEMPERATURE	DEG C	29.4

TOTAL FUEL SULFUR	MG/KM	26.28
AVG. EXH. OXYGEN	PCT	1.44
CATALYST AVG. TEMP.	DEG C	396
CATALYST MAX. TEMP.	DEG C	923

		2-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	191.9	(193.1)
FUEL CONSUMPTION	L/100KM	12.26	(12.39)
HYDROCARBONS (THC)	G/KM	1.93	(1.93)
CARBON MONOXIDE	G/KM	58.17	(58.20)
OXIDES OF NITROGEN	G/KM	.18	(.18)

PVM - 423 SBT VEHICLE EMISSIONS RESULTS - DISABLED EGR AND O2
PROJECT 11-9989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	423-32	423-33
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	1/23/79	1/23/79 / /
ODOMETER	10103KM(6278MILES)	10192KM(6302MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.0 / 77.0	26.1 / 79.0
RELATIVE HUMIDITY, PCT	15.6	12.9
BAROMETER, MM HG(IN HG)	737.9 (29.06)	737.9 (29.06)
RUN TIME, SECONDS	1347	765
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	46.1 (115.0)
BLOWER REVOLUTIONS	112188	61935
CVS FLOW STD. CU. METRES(SCF)	209.8 (7410.0)	115.0 (9063.1)
HC SAMPLE METER/RANGE/PPM	16.9/ 3/ 169	18.9/ 3/ 189
HC BCKGRD METER/RANGE/PPM	.6/ 3/ 6	.7/ 3/ 7
CO SAMPLE METER/RANGE/PPM	99.0/ 1/ 9106	53.1/ 1/ 9632
CO BCKGRD METER/RANGE/PPM	.2/ 1/ 11	.2/ 1/ 11
CO2 SAMPLE METER/RANGE/PCT	59.5/ 3/ .95	62.5/ 3/ 1.11
CO2 BCKGRD METER/RANGE/PCT	2.9/ 3/ .09	2.3/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	5.0/ 2/ 5	9.1/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.1/ 2/ 0	.1/ 2/ 0
HC CONCENTRATION PPM	169	178
CO CONCENTRATION PPM	3999	9504
CO2 CONCENTRATION PCT	.92	1.08
NOX CONCENTRATION PPM	4.4	9.0
HC MASS GRAMS	14.80	11.80
CO MASS GRAMS	477.11	603.39
CO2 MASS GRAMS	3590.9	2879.1
NOX MASS GRAMS	1.58	.78
DFC, WET (DRY)	.898 (.898)	.882 (.882)
SCF, WET (DRY)	1.000 (.999)	1.000 (.998)
VOL (SCM)	209.8	115.0
KM (MEASURED)	22.03	16.67

TEST NUMBER,	PVM-ST	423-32	423-33
BAROMETER,	MM HG	737.9	737.9
HUMIDITY,	G/KG	3.1	2.7
TEMPERATURE,	DEG C	25.0	26.1
TOTAL FUEL SULFUR,	MG/KM	21.39	17.91
AVG. EXH. OXYGEN,	PCT	.66	1.28
CATALYST AVG. TEMP.,	DEG C	996	513
CATALYST MAX. TEMP.,	DEG C	533	550
CARBON DIOXIDE,	G/KM	140.8	136.7
FUEL CONSUMPTION,	L/100KM	9.96	8.36
HYDROCARBONS,	G/KM	.90	.71
CARBON MONOXIDE,	G/KM	19.36	36.18
OXIDES OF NITROGEN,	G/KM	.07	.09

TABLE E-22. TEST NO. 424-1 EMISSIONS RESULTS

PVH - 424 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4489-001

TEST NO. 424-11 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 2/ 9/79
BAG CART NO. 1
DYNO NO. 1
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399
ODOMETER 12662 KM(7868 MILES)

BAROMETER 754.63 MM HG(29.71 IN HG)
RELATIVE HUMIDITY 13 PCT

DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 2.3 GM/KG

NOX HUMIDITY CORRECTION FACTOR .78

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	784.9 (31.1)	787.9 (31.0)	787.8 (31.0)	787.9 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.8 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	32.8 (109.0)	34.9 (102.0)	41.7 (107.0)	40.0 (104.0)
BLOWER REVOLUTIONS	55565	69629	90637	69639
CVS FLOW STD. CU. METRES(SCF)	77.7 (2746.7)	133.9 (4728.8)	77.8 (2748.6)	133.7 (4723.4)
HC SAMPLE METER/RANGE/PPM	87.1/ 2/ 87	8.3/ 2/ 8	13.7/ 2/ 19	8.3/ 2/ 8
HC BCKGRD METER/RANGE/PPM	6.7/ 2/ 7	7.0/ 2/ 7	8.0/ 2/ 8	7.1/ 2/ 7
CO SAMPLE METER/RANGE/PPM	89.0/ 3/ 555	15.2/13/ 15	51.6/13/ 99	19.1/13/ 19
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	2.9/13/ 2	1.9/13/ 2	1.9/13/ 2
CO2 SAMPLE METER/RANGE/PCT	99.5/ 3/ 1.05	90.8/ 3/ .69	98.2/ 3/ 1.03	92.6/ 3/ .73
CO2 BCKGRD METER/RANGE/PCT	2.8/ 3/ .09	3.2/ 3/ .05	2.7/ 3/ .09	2.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	56.6/ 2/ 57	19.5/ 2/ 19	27.0/ 2/ 27	19.5/ 2/ 19
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	1.0/ 2/ 1	.8/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	12.81	14.28	12.47	14.40
HC CONCENTRATION PPM	81	2	6	2
CO CONCENTRATION PPM	590	12	96	11
CO2 CONCENTRATION PCT	1.01	.68	.99	.68
NOX CONCENTRATION PPM	55.9	13.6	26.3	13.7
HC MASS GRAMS	9.63	.13	.28	.12
CO MASS GRAMS	98.89	1.88	9.19	1.79
CO2 MASS GRAMS	1993.3	1589.3	1909.7	1676.2
NOX MASS GRAMS	6.51	2.72	3.06	2.75
HC GRAMS/KM	.69	.02	.05	.02
CO GRAMS/KM	8.56	.24	.73	.28
CO2 GRAMS/KM	252.9	298.7	297.3	261.9
NOX GRAMS/KM	1.19	.93	.89	.93
FUEL CONSUMPTION BY CB L/100KM	11.96	10.69	10.61	11.18
RUN TIME SECONDS	505	967	505	968
AVG. EXH. OXYGEN PERCENT	1.59	1.56	1.20	1.90
CATALYST AVG. TEMP. DEG. C	198	918	377	997
CATALYST MAX. TEMP. DEG. C	923	969	992	995
MEASURED DISTANCE KM	5.71	6.37	5.70	6.41
DFC, WET (DRY)	.937 (.937)		.937 (.937)	
SCF, WET (DRY)	1.000 (.992)		1.000 (.992)	
VOL (SCM)	211.6		211.6	
KM (MEASURED)	12.08		12.11	

COMPOSITE RESULTS

					3-BAG	(9-BAG)
TEST NUMBER	424-11	TOTAL FUEL SULFUR MG/KM	23.13	CARBON DIOXIDE G/KM	299.1	(253.0)
BAROMETER MM HG	754.6	AVG. EXH. OXYGEN PCT	1.99	FUEL CONSUMPTION L/100KM	10.79	(10.96)
HUMIDITY G/KG	2.3	CATALYST AVG. TEMP. DEG C	396	HYDROCARBONS (THC) G/KM	.15	(.15)
TEMPERATURE DEG C	22.8	CATALYST MAX. TEMP. DEG C	948	CARBON MONOXIDE G/KM	2.09	(2.09)
				OXIDES OF NITROGEN G/KM	.60	(.60)

PVH - 424 3BT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4489-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-399

TEST NUMBER	424-12	424-13
TEST CYCLE	3BT	HFET
RUN NUMBER	1	1
DATE	2/ 9/79	2/ 9/79 / /
ODOMETER	12695KM(7888MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.3 / 74.0	23.9 / 75.0
RELATIVE HUMIDITY, PCT	17.9	15.6
BAROMETER, MM HG(IN HG)	755.9 (29.76)	759.9 (29.70)
RUN TIME, SECONDS	1398	766
BLOWER DIF P MM. H2O(IN. H2O)	787.9 (31.0)	787.9 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	113221	63266
CVS FLOW STD. CU. METRES(SCF)	214.5 (7695.8)	120.9 (4269.8)
HC SAMPLE METER/RANGE/PPM	9.9/ 2/ 9	9.2/ 2/ 9
HC BCKGRD METER/RANGE/PPM	5.6/ 2/ 6	5.8/ 2/ 6
CO SAMPLE METER/RANGE/PPM	59.1/13/ 57	36.9/13/ 36
CO BCKGRD METER/RANGE/PPM	1.1/13/ 1	1.2/13/ 1
CO2 SAMPLE METER/RANGE/PCT	65.9/ 3/ 1.17	79.2/ 3/ 1.37
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	2.9/ 3/ .04
NOX SAMPLE METER/RANGE/PPM	28.0/ 2/ 28	93.2/ 2/ 93
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	.8/ 2/ 1
HC CONCENTRATION PPM	9	9
CO CONCENTRATION PPM	59	32
CO2 CONCENTRATION PCT	1.13	1.33
NOX CONCENTRATION PPM	27.9	92.5
HC MASS GRAMS	.59	.28
CO MASS GRAMS	13.68	9.55
CO2 MASS GRAMS	9970.7	2946.2
NOX MASS GRAMS	9.06	7.81
DFC, WET (DRY)	.912 (.912)	.897 (.897)
SCF, WET (DRY)	1.000 (.989)	1.000 (.987)
VOL (SCM)	216.5	120.9
KM (MEASURED)	22.12	16.82
TEST NUMBER, PVH-ST	424-12	424-13
BAROMETER, MM HG	755.9	759.9
HUMIDITY, G/KG	3.1	2.9
TEMPERATURE, DEG C	23.3	23.9
TOTAL FUEL SULFUR, MG/KM	18.59	16.06
AVG. EXH. OXYGEN, PCT	1.03	.97
CATALYST AVG. TEMP., DEG C	506	671
CATALYST MAX. TEMP., DEG C	604	610
CARBON DIOXIDE, G/KM	202.1	176.1
FUEL CONSUMPTION, L/100KM	8.67	7.50
HYDROCARBONS, G/KM	.02	.02
CARBON MONOXIDE, G/KM	.62	.27
OXIDES OF NITROGEN, G/KM	.91	.96

TABLE E-23. TEST ID. 424-2 EMISSIONS RESULTS

PVM - 424 FTP VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4989-001

TEST NO. 424-24 RUN #
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 48
DATE 5/24/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394
ODOMETER 13036 KM(8100 MILES)

BAROMETER 743.20 MM HG(29.26 IN HG)
RELATIVE HUMIDITY 62 PCT

DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 11.8 GM/KG

NOX HUMIDITY CORRECTION FACTOR 1.09

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM, H2O(IN, H2O)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	40.6 (105.0)	32.2 (108.0)	32.2 (108.0)
BLOWER REVOLUTIONS	40590	44582	40998	44415
CVS FLOW STD, CU. METERS(SCF)	75.8 (2678.2)	130.8 (4619.4)	75.9 (2680.3)	130.1 (4594.0)
HC SAMPLE METER/RANGE/PPM	13.4/ 3/ 139	19.3/ 2/ 19	89.1/ 2/ 89	19.0/ 2/ 19
HC BCKGRD METER/RANGE/PPM	1.5/ 3/ 15	19.1/ 2/ 19	12.5/ 2/ 13	12.6/ 2/ 13
CO SAMPLE METER/RANGE/PPM	39.4/ 3/ 884	20.6/13/ 20	96.0/13/ 99	17.0/13/ 16
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	1.6/13/ 2	1.3/13/ 1	1.2/13/ 1
CO2 SAMPLE METER/RANGE/PCT	65.6/ 3/ 1.19	93.6/ 3/ .75	61.7/ 3/ 1.10	91.8/ 3/ .71
CO2 BCKGRD METER/RANGE/PCT	3.4/ 3/ .05	9.1/ 3/ .06	3.4/ 3/ .05	8.5/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	40.6/ 2/ 41	9.5/ 2/ 10	23.6/ 2/ 24	13.1/ 2/ 13
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	.9/ 2/ 1	.9/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	18.59	17.98	18.13	18.76
HC CONCENTRATION PPM	125	1	13	2
CO CONCENTRATION PPM	786	17	58	15
CO2 CONCENTRATION PCT	1.13	.69	1.09	.66
NOX CONCENTRATION PPM	39.6	8.7	23.8	12.2
HC MASS GRAMS	5.99	.07	.55	.16
CO MASS GRAMS	64.99	2.66	9.95	2.21
CO2 MASS GRAMS	1566.2	1402.5	1998.0	1573.9
NOX MASS GRAMS	5.96	2.25	3.96	3.16
HC GRAMS/KM	.96	.01	.10	.03
CO GRAMS/KM	10.21	.43	1.77	.36
CO2 GRAMS/KM	276.9	246.3	350.7	253.9
NOX GRAMS/KM	1.09	.36	.60	.51
FUEL CONSUMPTION AT CR L/100KM	12.78	11.35	10.76	10.86
RUN TIME SECONDS	505	867	506	867
AVG. EXH. OXYGEN PERCENT	1.66	.78	1.10	.46
CATALYST AVG. TEMP. DEG. C	-	-	398	447
CATALYST MAX. TEMP. DEG. C	-	967	982	978
MEASURED DISTANCE KM	5.69	6.19	5.78	6.20
DFC, WET (DRY)	.930 (.917)		.936 (.923)	
SCF, WET (DRY)	1.000 (.978)		1.000 (.978)	
VOL (SCM)	206.6		206.0	
KM (MEASURED)	11.88		11.97	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	424-24	TOTAL FUEL SULFUR MG/KM	29.58	CARBON DIOXIDE G/KM		263.9	(260.0)
BAROMETER MM HG	743.2	AVG. EXH. OXYGEN PCT	.99	FUEL CONSUMPTION L/100KM		11.97	(11.38)
HUMIDITY G/KG	11.8	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM		.23	(.23)
TEMPERATURE DEG C	23.9	CATALYST MAX. TEMP. DEG C	982	CARBON MONOXIDE G/KM		2.95	(2.93)
				OXIDES OF NITROGEN G/KM		.57	(.61)

PVM - 424 SRT VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4989-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 48
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394

TEST NUMBER	424-22	424-23
TEST CYCLE	SET	HFET
RUN NUMBER	2	2
DATE	5/24/79	5/24/79 / /
ODOMETER	13052KM(8110MILES)	13060KM(8115MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	25.0 / 77.0
RELATIVE HUMIDITY, PCT	49.0	38.9
BAROMETER, MM HG(IN HG)	743.2 (29.26)	743.2 (29.26)
RUN TIME, SECONDS	1996	765
BLOWER DIF P MM, H2O(IN, H2O)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM, H2O(IN, H2O)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	111899	41315
CVS FLOW STD, CU. METERS(SCF)	209.2 (7388.1)	119.7 (4050.1)
HC SAMPLE METER/RANGE/PPM	16.0/ 2/ 16	14.9/ 2/ 15
HC BCKGRD METER/RANGE/PPM	11.7/ 2/ 12	10.7/ 2/ 11
CO SAMPLE METER/RANGE/PPM	93.1/13/ 91	36.1/13/ 34
CO BCKGRD METER/RANGE/PPM	1.9/13/ 1	1.1/13/ 1
CO2 SAMPLE METER/RANGE/PCT	64.2/ 3/ 1.19	83.1/ 3/ 1.53
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .05	3.9/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	29.6/ 2/ 30	93.9/ 2/ 99
NOX BCKGRD METER/RANGE/PPM	2.7/ 2/ 3	2.7/ 2/ 3
HC CONCENTRATION PPM	4	5
CO CONCENTRATION PPM	38	32
CO2 CONCENTRATION PCT	1.19	1.09
NOX CONCENTRATION PPM	27.1	91.5
HC MASS GRAMS	.69	.36
CO MASS GRAMS	4.27	2.25
CO2 MASS GRAMS	9360.5	3129.7
NOX MASS GRAMS	10.28	8.17
DFC, WET (DRY)	.911 (.903)	.885 (.881)
SCF, WET (DRY)	1.000 (.988)	1.000 (.981)
VOL (SCM)	209.2	119.7
KM (MEASURED)	21.67	16.99

TEST NUMBER,	PVM-SRT	424-22	424-23
BAROMETER,	MM HG	743.2	743.2
HUMIDITY,	G/KG	9.0	7.2
TEMPERATURE,	DEG C	23.9	25.0
TOTAL FUEL SULFUR,	MG/KM	18.97	17.98
AVG. EXH. OXYGEN,	PCT	.75	.37
CATALYST AVG. TEMP.,	DEG C	494	564
CATALYST MAX. TEMP.,	DEG C	598	693
CARBON DIOXIDE,	G/KM	201.6	190.0
FUEL CONSUMPTION,	L/100KM	8.62	8.13
HYDROCARBONS,	G/KM	.03	.02
CARBON MONOXIDE,	G/KM	.33	.26
OXIDES OF NITROGEN,	G/KM	.97	.50

TABLE E-24. TEST NO. 424-3 EMISSIONS RESULTS

PVN - 424 FTP VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4484-001

TEST NO. 424-31 RUN 1
VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

VEHICLE NO. 42
DATE 5/25/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394
ODOMETER 13126 KM(8156 MILES)

DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
ABS. HUMIDITY 7.6 GM/KG

NOX HUMIDITY CORRECTION FACTOR .91

BAROMETER 744.23 MM HG(29.32 IN HG)
RELATIVE HUMIDITY 48 PCT

BAG RESULTS	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H2O(IN. H2O)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.0 (111.0)	40.6 (105.0)	42.8 (109.0)	41.7 (107.0)
BLOWER REVOLUTIONS	90547	69999	90558	69999
CVS FLOW STD. CU. METRES(SCF)	74.0 (2609.8)	130.4 (4629.5)	74.2 (2640.7)	130.6 (4619.5)
HC SAMPLE METER/RANGE/PPM	15.3/ 3/ 153	15.9/ 8/ 15	22.3/ 2/ 22	11.1/ 2/ 11
HC BCKGRD METER/RANGE/PPM	1.8/ 3/ 18	14.7/ 8/ 15	10.7/ 2/ 11	9.5/ 2/ 10
CO SAMPLE METER/RANGE/PPM	36.0/ 3/ 851	14.0/13/ 14	32.0/13/ 31	19.7/13/ 19
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	2.1/13/ 2	1.3/13/ 1	1.9/13/ 1
CO2 SAMPLE METER/RANGE/PCT	62.9/ 3/ 1.11	91.9/ 3/ .71	61.3/ 3/ 1.09	92.1/ 3/ .72
CO2 BCKGRD METER/RANGE/PCT	3.4/ 3/ .05	3.5/ 3/ .05	3.7/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	98.5/ 2/ 98	11.5/ 8/ 11	29.6/ 2/ 29	15.6/ 2/ 15
NOX BCKGRD METER/RANGE/PPM	1.7/ 2/ 2	1.6/ 8/ 2	1.9/ 2/ 1	1.8/ 2/ 1
DILUTION FACTOR	11.09	18.70	12.25	18.63
HC CONCENTRATION PPM	137	1	12	2
CO CONCENTRATION PPM	818	14	89	12
CO2 CONCENTRATION PCT	1.06	.66	1.09	.66
NOX CONCENTRATION PPM	97.0	10.0	28.1	13.5
HC MASS GRAMS	5.99	.11	.55	.16
CO MASS GRAMS	78.91	2.50	2.55	1.89
CO2 MASS GRAMS	1980.3	1588.3	1996.9	1586.9
NOX MASS GRAMS	6.20	2.27	3.72	3.05
HC GRAMS/KM	1.09	.02	.09	.03
CO GRAMS/KM	12.62	.40	.99	.30
CO2 GRAMS/KM	258.1	254.1	244.5	254.2
NOX GRAMS/KM	1.08	.37	.89	.44
FUEL CONSUMPTION BY CB L/100KM	12.00	10.96	10.69	10.96
RUN TIME SECONDS	505	867	505	868
AVG. EXH. OXYGEN PERCENT	1.10	1.02	1.21	1.28
CATALYST AVG. TEMP. DEG. C	191	912	388	939
CATALYST MAX. TEMP. DEG. C	902	953	974	971
MEASURED DISTANCE KM	5.79	6.20	5.80	6.19
DFC, WET (DRY)	.933 (.925)		.936 (.928)	
SCF, WET (DRY)	1.000 (.983)		1.000 (.983)	
VOL (SCM)	204.9		204.8	
KM (MEASURED)	11.99		11.99	

COMPOSITE RESULTS

TEST NUMBER		424-31
BAROMETER	MM HG	744.7
HUMIDITY	G/KG	7.6
TEMPERATURE	DEG C	21.1

TOTAL FUEL SULFUR	MG/KM	23.79
AVG. EXH. OXYGEN	PCT	1.08
CATALYST AVG. TEMP.	DEG C	372
CATALYST MAX. TEMP.	DEG C	979

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	259.7	(259.7)
FUEL CONSUMPTION	L/100KM	11.10	(11.10)
HYDROCARBONS (THC)	G/KM	.28	(.28)
CARBON MONOXIDE	G/KM	2.99	(2.91)
OXIDES OF NITROGEN	G/KM	.59	(.63)

PVN - 424 3BT VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4484-001

VEHICLE MODEL 78 PONTIAC SUNBIRD
ENGINE 2.5 L(151 CID) L-4

VEHICLE NO. 42
TRANSMISSION A3
GVW 1720 KG(3791 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 6.7 KW(9.0 HP)
GASOLINE EM-394

TEST NUMBER	424-32	424-33
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	5/25/78	5/25/78 / /
ODOMETER	13071KM(8122MILES)	0KM(-0MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	21.1 / 70.0
RELATIVE HUMIDITY, PCT	50.9	51.8
BAROMETER, MM HG(IN HG)	741.9 (29.21)	744.7 (29.32)
RUN TIME, SECONDS	1347	765
BLOWER DIF P MM. H2O(IN. H2O)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H2O(IN. H2O)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	43.3 (110.0)
BLOWER REVOLUTIONS	111991	61380
CVS FLOW STD. CU. METRES(SCF)	208.6 (7366.3)	115.1 (4063.8)
HC SAMPLE METER/RANGE/PPM	13.7/ 2/ 14	20.1/ 2/ 20
HC BCKGRD METER/RANGE/PPM	9.1/ 2/ 9	20.1/ 2/ 20
CO SAMPLE METER/RANGE/PPM	99.5/13/ 97	97.1/13/ 95
CO BCKGRD METER/RANGE/PPM	1.2/13/ 1	1.2/13/ 1
CO2 SAMPLE METER/RANGE/PCT	69.3/ 3/ 1.15	81.5/ 3/ 1.50
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	29.7/ 2/ 30	95.3/ 2/ 95
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1	.0/ 2/ 1
HC CONCENTRATION PPM	5	2
CO CONCENTRATION PPM	99	92
CO2 CONCENTRATION PCT	1.10	1.45
NOX CONCENTRATION PPM	28.8	99.6
HC MASS GRAMS	.65	.15
CO MASS GRAMS	10.79	5.59
CO2 MASS GRAMS	9140.0	3053.9
NOX MASS GRAMS	10.95	9.07
DFC, WET (DRY)	.919 (.908)	.888 (.878)
SCF, WET (DRY)	1.000 (.983)	1.000 (.976)
VOL (SCM)	208.6	115.1
KM (MEASURED)	21.67	14.60

TEST NUMBER,	PVN-BT	424-32	424-33
BAROMETER,	MM HG	741.9	744.7
HUMIDITY,	G/KG	7.7	8.2
TEMPERATURE,	DEG C	23.9	21.1
TOTAL FUEL SULFUR,	MG/KM	17.77	16.87
AVG. EXH. OXYGEN,	PCT	.85	.95
CATALYST AVG. TEMP.,	DEG C	983	576
CATALYST MAX. TEMP.,	DEG C	967	601
CARBON DIOXIDE,	G/KM	193.9	183.9
FUEL CONSUMPTION,	L/100KM	8.29	7.87
HYDROCARBONS,	G/KM	.03	.01
CARBON MONOXIDE,	G/KM	.50	.39
OXIDES OF NITROGEN,	G/KM	.98	.55

TABLE E-25. TEST NO. 431-1 EMISSIONS RESULTS

PVM - 431 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4489-001

TEST NO. 431-11 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

VEHICLE NO. 93
DATE 12/ 7/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399
ODOMETER 9260 KM(8597 MILES)

BAROMETER 739.65 MM HG(29.12 IN HG)
RELATIVE HUMIDITY 38 PCT
BAG RESULTS

DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 7.1 GM/KG

NOX HUMIDITY CORRECTION FACTOR .84

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	41.1 (106.0)	42.2 (108.0)	42.2 (108.0)	42.2 (108.0)
BLOWER REVOLUTIONS	90796	69723	90572	69699
CVS FLOW STD. CU. METRES(SCF)	76.7 (2709.4)	131.0 (4626.7)	76.2 (2692.4)	130.8 (4621.4)
HC SAMPLE METER/RANGE/PPM	99.6/ 2/ 60	8.7/ 2/ 4	23.0/ 2/ 23	7.5/ 2/ 8
HC BCKGRD METER/RANGE/PPM	7.6/ 2/ 8	7.8/ 2/ 8	7.1/ 2/ 7	6.8/ 2/ 7
CO SAMPLE METER/RANGE/PPM	77.4/11/ 398	16.0/13/ 15	96.7/13/ 99	5.9/13/ 6
CO BCKGRD METER/RANGE/PPM	.8/11/ 2	1.3/13/ 1	.6/13/ 1	.7/13/ 1
CO2 SAMPLE METER/RANGE/PCT	68.4/ 3/ 1.24	91.4/ 3/ .71	59.2/ 3/ 1.05	91.6/ 3/ .71
CO2 BCKGND METER/RANGE/PCT	3.7/ 3/ .06	3.5/ 3/ .05	3.5/ 3/ .05	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	9.4/ 2/ 9	2.0/ 2/ 2	7.3/ 2/ 7	2.7/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.9/ 2/ 1	.9/ 2/ 1	.8/ 2/ 1
DILUTION FACTOR	18.96	18.73	12.65	18.90
HC CONCENTRATION PPM	93	1	16	1
CO CONCENTRATION PPM	333	19	95	9
CO2 CONCENTRATION PCT	1.19	.66	1.00	.65
NOX CONCENTRATION PPM	8.6	1.1	6.5	1.9
HC MASS GRAMS	2.33	.10	.72	.08
CO MASS GRAMS	24.79	2.09	8.92	.76
CO2 MASS GMAMS	1672.8	1589.1	1392.8	1566.7
NOX MASS GRAMS	1.13	.24	.89	.93
HC GRAMS/KM	.90	.02	.12	.01
CO GRAMS/KM	9.11	.33	1.45	.12
CO2 GRAMS/KM	287.9	253.9	239.6	250.5
NOX GRAMS/KM	.19	.04	.18	.07
FUEL CONSUMPTION BY CB L/100KM	12.66	10.89	10.39	10.70
RUN TIME SECONDS	505	868	504	867
AVG. EXH. OXYGEN PERCENT	-	-	-	-
CATALYST AVG. TEMP. DEG. C	489	510	491	495
CATALYST MAX. TEMP. DEG. C	496	572	510	525
MEASURED DISTANCE KM	5.82	6.27	5.81	6.25
DFC, WET (DRY)	.931 (.924)		.937 (.932)	
SCF, WET (DRY)	1.000 (.986)		1.000 (.987)	
VOL (SCM)	207.7		207.1	
KM (MEASURED)	12.09		12.07	

COMPOSITE RESULTS

TEST NUMBER		431-11	TOTAL FUEL SULFUR	MG/KM	23.75		3-BAG (4-BAG)
BAROMETER	MM HG	739.6	AVG. EXH. OXYGEN	PCT	-	CARBON DIOXIDE	G/KM 256.7 (256.8)
HUMIDITY	G/KG	7.1	CATALYST AVG. TEMP.	DEG C	-	FUEL CONSUMPTION	L/100KM 11.08 (11.09)
TEMPERATURE	DEG C	23.9	CATALYST MAX. TEMP.	DEG C	-	HYDROCARBONS (THC)	G/KM .13 (.12)
						CARBON MONOXIDE	G/KM 1.63 (1.57)
						OXIDES OF NITROGEN	G/KM .10 (.11)

PVM - 431 3BT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4489-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399

TEST NUMBER	431-12	431-13
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	12/ 7/78	12/ 7/78 / /
ODOMETER	0KM(-0MILES)	0KM(-0MILES)
CVS ; BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	24.9 / 76.8
RELATIVE HUMIDITY, PCT	37.7	32.1
BAROMETER, MM HG(IN HG)	739.1 (29.10)	738.9 (29.07)
RUN TIME, SECONDS	1397	766
BLOWER DIF P MM, H2O(IN, H2O)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	112331	61577
CVS FLOW STD. CU. METRES(SCF)	210.5 (7434.0)	115.2 (4070.4)
HC SAMPLE METER/RANGE/PPM	12.8/ 2/ 13	16.7/ 2/ 17
HC BCKGRD METER/RANGE/PPM	6.4/ 2/ 6	6.5/ 2/ 7
CO SAMPLE METER/RANGE/PPM	91.6/13/ 93	82.8/12/ 193
CO BCKGRD METER/RANGE/PPM	1.1/13/ 1	.6/12/ 1
CO2 SAMPLE METER/RANGE/PCT	71.2/ 3/ 1.29	86.0/ 3/ 1.54
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	3.3/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	9.4/ 2/ 9	9.1/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.5/ 2/ 1	.7/ 2/ 1
HC CONCENTRATION PPM	3	11
CO CONCENTRATION PPM	88	189
CO2 CONCENTRATION PCT	1.24	1.55
NOX CONCENTRATION PPM	9.9	9.5
HC MASS GRAMS	.85	.73
CO MASS GRAMS	21.63	24.71
CO2 MASS GRAMS	2794.6	3271.5
NOX MASS GRAMS	1.60	.86
DFC, WET (DRY)	.903 (.898)	.879 (.876)
SCF, WET (DRY)	1.000 (.982)	1.000 (.981)
VOL (SCM)	210.5	115.2
KM (MEASURED)	22.08	16.67
TEST NUMBER,	431-12	431-13
BAROMETER, MM HG	739.1	738.9
HUMIDITY, G/KG	7.1	6.3
TEMPERATURE, DEG C	23.9	24.4
TOTAL FUEL SULFUR, MG/KM	20.02	18.18
AVG. EXH. OXYGEN, PCT	-	-
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	-	-
CARBON DIOXIDE, G/KM	217.2	196.3
FUEL CONSUMPTION, L/100KM	9.39	8.98
HYDROCARBONS, G/KM	.09	.09
CARBON MONOXIDE, G/KM	.98	1.48
OXIDES OF NITROGEN, G/KM	.07	.05

TABLE E-26. TEST NO. 431-2 EMISSIONS RESULTS

PVM - 431 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4484-001

TEST NO. 431-21 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

VEHICLE NO. 93
DATE 12/15/78
RAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 9709 KM(6026 MILES)

BAROMETER 744.98 MM HG(29.33 IN HG)
RELATIVE HUMIDITY 41 PCT
DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
ABS. HUMIDITY 7.7 GM/KG
NOX HUMIDITY CORRECTION FACTOR .91

RAG RESULTS

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
RAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	99.9 (112.0)	99.3 (110.0)	99.3 (110.0)	99.3 (110.0)
BLOWER REVOLUTIONS	40650	81712	40512	81644
CVS FLOW STD. CU. METRES(SCF)	76.7 (2707.3)	131.7 (4651.9)	76.5 (2703.2)	131.7 (4650.1)
HC SAMPLE METER/RANGE/PPM	11.5/ 3/ 115	69.9/ 2/ 70	11.3/ 3/ 113	81.0/ 2/ 81
HC BCKGRD METER/RANGE/PPM	1.9/ 3/ 19	11.8/ 2/ 12	1.2/ 3/ 12	11.5/ 2/ 11
CO SAMPLE METER/RANGE/PPM	58.3/ 3/ 1960	35.8/ 3/ 896	66.9/ 3/ 1723	94.2/ 3/ 1201
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	.1/ 3/ 2	.2/ 3/ 5	.9/ 3/ 9
CO2 SAMPLE METER/RANGE/PCT	62.1/ 3/ 1.10	38.2/ 3/ .69	59.1/ 3/ .95	37.1/ 3/ .62
CO2 BCKGRD METER/RANGE/PCT	3.8/ 3/ .06	3.6/ 3/ .06	3.1/ 3/ .05	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	11.8/ 2/ 12	6.6/ 2/ 7	15.2/ 2/ 15	8.0/ 2/ 8
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.8/ 2/ 1	.8/ 2/ 1	.9/ 2/ 1
DILUTION FACTOR	10.66	18.26	11.41	17.88
HC CONCENTRATION PPM	102	54	102	78
CO CONCENTRATION PPM	1908	823	1669	1162
CO2 CONCENTRATION PCT	1.05	.54	.90	.57
NOX CONCENTRATION PPM	11.1	5.8	14.5	7.2
HC MASS GRAMS	4.52	4.46	4.50	5.33
CO MASS GRAMS	185.68	186.14	198.33	178.18
CO2 MASS GRAMS	1976.7	1928.3	1966.0	1374.2
NOX MASS GRAMS	1.48	1.39	1.43	1.69
HC GRAMS/KM	.28	.21	.27	.25
CO GRAMS/KM	21.55	20.07	25.37	28.35
CO2 GRAMS/KM	259.2	227.2	216.6	219.5
NOX GRAMS/KM	.25	.21	.23	.26
FUEL CONSUMPTION BY CB L/100KM	12.36	11.19	11.08	11.38
RUN TIME SECONDS	505	868	509	868
AVG. EXH. OXYGEN PERCENT	.19	.22	.19	.24
CATALYST AVG. TEMP. DEG. C	923	973	918	999
CATALYST MAX. TEMP. DEG. C	636	564	543	529
MEASURED DISTANCE KM	5.83	6.24	5.85	6.28
DFC, WET (DRY)	.931 (.925)		.934 (.927)	
SCF, WET (DRY)	1.000 (.994)		1.000 (.994)	
VOL (SCM)	288.3		288.2	
KM (MEASURED)	12.12		12.13	

COMPOSITE RESULTS

					3-BAG	(9-BAG)
TEST NUMBER	431-21	TOTAL FUEL SULFUR MG/KM	29.36	CARBON DIOXIDE G/KM	229.7	(227.4)
BAROMETER MM HG	745.0	AVG. EXH. OXYGEN PCT	.20	FUEL CONSUMPTION L/100KM	11.37	(11.44)
HUMIDITY G/KG	7.7	CATALYST AVG. TEMP. DEG C	—	HYDROCARBONS (THC) G/KM	.26	(.28)
TEMPERATURE DEG C	23.9	CATALYST MAX. TEMP. DEG C	—	CARBON MONOXIDE G/KM	21.83	(24.28)
				OXIDES OF NITROGEN G/KM	.25	(.27)

PVM - 431 HOT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4484-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	431-22	431-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	12/15/78	12/15/78
ODOMETER	0KM(-0MILES)	0KM(-0MILES)
CVS - RAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.0 / 77.0	26.1 / 79.0
RELATIVE HUMIDITY, PCT	32.8	28.5
BAROMETER, MM HG(IN HG)	744.2 (29.30)	744.2 (29.30)
RUN TIME, SECONDS	1393	766
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	99.9 (112.0)	99.9 (112.0)
BLOWER REVOLUTIONS	111835	61615
CVS FLOW STD. CU. METRES(SCF)	210.6 (7434.2)	116.0 (4098.8)
HC SAMPLE METER/RANGE/PPM	13.2/ 3/ 132	16.8/ 3/ 168
HC BCKGRD METER/RANGE/PPM	1.1/ 3/ 11	1.9/ 3/ 19
CO SAMPLE METER/RANGE/PPM	99.9/ 3/ 2728	93.3/ 1/ 3998
CO BCKGRD METER/RANGE/PPM	.5/ 3/ 11	.2/ 1/ 11
CO2 SAMPLE METER/RANGE/PCT	63.5/ 3/ 1.13	78.8/ 3/ 1.44
CO2 BCKGRD METER/RANGE/PCT	3.2/ 3/ .05	5.5/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	19.9/ 2/ 19	17.9/ 2/ 18
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	1.0/ 2/ 1
HC CONCENTRATION PPM	122	156
CO CONCENTRATION PPM	2624	3303
CO2 CONCENTRATION PCT	1.09	1.38
NOX CONCENTRATION PPM	13.9	17.0
HC MASS GRAMS	19.89	10.93
CO MASS GRAMS	699.91	996.32
CO2 MASS GRAMS	9208.5	2993.3
NOX MASS GRAMS	9.92	3.28
DFC, WET (DRY)	.895 (.891)	.866 (.864)
SCF, WET (DRY)	1.000 (.995)	1.000 (.989)
VOL (SCM)	210.6	116.0
KM (MEASURED)	21.82	16.67
TEST NUMBER, PVM-ST	431-22	431-23
BAROMETER, MM HG	744.2	744.2
HUMIDITY, G/KG	6.4	6.1
TEMPERATURE, DEG C	25.0	26.1
TOTAL FUEL SULFUR, MG/KM	22.06	20.14
AVG. EXH. OXYGEN, PCT	.10	.01
CATALYST AVG. TEMP., DEG C	—	—
CATALYST MAX. TEMP., DEG C	—	—
CARBON DIOXIDE, G/KM	192.5	176.6
FUEL CONSUMPTION, L/100KM	10.24	9.42
HYDROCARBONS, G/KM	.68	.63
CARBON MONOXIDE, G/KM	24.56	24.78
OXIDES OF NITROGEN, G/KM	.23	.20

TABLE E-27. TEST NO. 431-3 EMISSIONS RESULTS

PVM - 431 FTP VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4989-001

TEST NO. 431-31 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1724 KG(3810 LBS)

VEHICLE NO. 43
DATE 12/18/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 4996 KM(3011 MILES)

BAROMETER 746.2% MM HG(29.38 IN HG)
RELATIVE HUMIDITY 42 PCT

DRY BULB TEMP. 29.4 DEG C(76.0 DEG F)
ABS. HUMIDITY 8.1 GM/KG

NOX HUMIDITY CORRECTION FACTOR .92

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	40.6 (105.0)	37.8 (100.0)	37.8 (100.0)	43.3 (110.0)
BLOWER REVOLUTIONS	49879	69616	49988	69655
CVS FLOW STD. CU. METRES(SCF)	77.5 (2735.6)	133.3 (4707.0)	77.5 (2737.1)	131.9 (4660.3)
HC SAMPLE METER/RANGE/PPM	11.5/ 3/ 115	46.0/ 2/ 46	10.6/ 3/ 106	72.0/ 2/ 72
HC BCKGRD METER/RANGE/PPM	1.5/ 3/ 15	15.9/ 2/ 15	2.0/ 3/ 20	20.6/ 2/ 21
CO SAMPLE METER/RANGE/PPM	56.6/ 3/ 1911	31.4/ 3/ 736	50.1/ 3/ 1226	32.9/ 3/ 761
CO BCKGRD METER/RANGE/PPM	1.2/ 3/ 27	1.3/ 3/ 29	.9/ 3/ 20	1.0/ 3/ 23
CO2 SAMPLE METER/RANGE/PCT	66.0/ 3/ 1.18	40.0/ 3/ .68	59.6/ 3/ 1.06	40.3/ 3/ .68
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	4.4/ 3/ .08	4.4/ 3/ .07	4.3/ 3/ .07
NOX SAMPLE METER/RANGE/PPM	10.1/ 2/ 10	4.4/ 2/ 5	12.4/ 2/ 13	5.4/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.2/ 2/ 1	1.2/ 2/ 1	1.2/ 2/ 1	1.4/ 2/ 1
DILUTION FACTOR	18.07	17.73	11.32	17.53
HC CONCENTRATION PPM	101	51	88	53
CO CONCENTRATION PPM	1335	689	1166	720
CO2 CONCENTRATION PCT	1.12	.61	.99	.62
NOX CONCENTRATION PPM	4.0	3.8	11.8	4.1
HC MASS GRAMS	4.53	3.46	3.42	4.00
CO MASS GRAMS	120.44	106.93	105.24	110.56
CO2 MASS GRAMS	1593.8	1980.4	1909.8	1590.6
NOX MASS GRAMS	1.23	.88	1.61	.96
HC GRAMS/KM	.27	.63	.68	.65
CO GRAMS/KM	20.56	17.10	18.27	17.43
CO2 GRAMS/KM	272.1	336.8	344.7	293.4
NOX GRAMS/KM	.21	.15	.28	.15
FUEL CONSUMPTION MY CB L/100KM	13.10	11.34	11.74	11.68
RUN TIME SECONDS	504	966	503	867
AVG. EXH. OXYGEN PERCENT	.62	.82	.51	.81
CATALYST AVG. TEMP. DEG. C	348	403	389	400
CATALYST MAX. TEMP. DEG. C	592	482	-	-
MEASURED DISTANCE KM	5.84	6.25	5.76	6.16
DFC, WET (DRY)	.928 (.921)		.931 (.925)	
SCF, WET (DRY)	1.000 (.985)		1.000 (.985)	
VOL (SCM)	210.7		209.9	
KM (MEASURED)	12.11		11.93	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	431-31	TOTAL FUEL SULFUR MG/KM	25.33	CARBON DIOXIDE G/KM	296.3	(298.3)
BAROMETER MM HG	746.3	AVG. EXH. OXYGEN PCT	.72	FUEL CONSUMPTION L/100KM	11.82	(11.92)
HUMIDITY G/KG	8.1	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.68	(.68)
TEMPERATURE DEG C	29.4	CATALYST MAX. TEMP. DEG C	-	CARBON MONOXIDE G/KM	18.14	(18.34)
				OXIDES OF NITROGEN G/KM	.14	(.20)

PVM - 431 SBT VEHICLE EMISSIONS RESULTS - DISABLED O SENSOR
PROJECT 11-4989-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 43
TRANSMISSION A3
GVW 1724 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	431-32	431-33
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	12/18/78	12/18/78 / /
ODOMETER	4994KM(3044MILES)	4997KM(3046MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	28.8 / 73.0	25.0 / 77.0
RELATIVE HUMIDITY, PCT	53.7	42.3
BAROMETER, MM HG(IN HG)	745.5 (29.35)	745.5 (29.35)
RUN TIME, SECONDS	1398	767
BLOWER DIF P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	42.8 (109.0)
BLOWER REVOLUTIONS	112344	61405
CVS FLOW STD. CU. METRES(SCF)	210.7 (7442.2)	115.8 (4089.0)
HC SAMPLE METER/RANGE/PPM	11.6/ 3/ 116	15.5/ 3/ 155
HC BCKGRD METER/RANGE/PPM	1.4/ 3/ 14	2.2/ 3/ 22
CO SAMPLE METER/RANGE/PPM	67.6/ 3/ 1745	95.4/ 3/ 2764
CO BCKGRD METER/RANGE/PPM	.7/ 3/ 16	1.4/ 3/ 32
CO2 SAMPLE METER/RANGE/PCT	68.4/ 3/ 1.24	83.1/ 3/ 1.53
CO2 BCKGRD METER/RANGE/PCT	4.2/ 3/ .06	4.1/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	19.1/ 2/ 19	15.6/ 2/ 15
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1	.4/ 2/ 1
HC CONCENTRATION PPM	99	134
CO CONCENTRATION PPM	1654	2622
CO2 CONCENTRATION PCT	1.18	1.98
NOX CONCENTRATION PPM	13.2	19.7
HC MASS GRAMS	12.03	9.08
CO MASS GRAMS	483.83	353.53
CO2 MASS GRAMS	9569.9	3137.1
NOX MASS GRAMS	5.11	3.09
DFC, WET (DRY)	.899 (.889)	.865 (.858)
SCF, WET (DRY)	1.000 (.978)	1.000 (.974)
VOL (SCM)	210.7	115.8
KM (MEASURED)	21.85	10.65
TEST NUMBER, PVM-ST	431-32	431-33
BAROMETER, MM HG	745.5	745.5
HUMIDITY, G/KG	9.5	8.5
TEMPERATURE, DEG C	22.8	25.0
TOTAL FUEL SULFUR, MG/KM	21.96	28.99
AVG. EXH. OXYGEN, PCT	.99	.84
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	-	-
CARBON DIOXIDE, G/KM	289.1	188.9
FUEL CONSUMPTION, L/100KM	10.24	9.59
HYDROCARBONS, G/KM	.55	.55
CARBON MONOXIDE, G/KM	18.63	21.23
OXIDES OF NITROGEN, G/KM	.23	.18

TABLE E-28. TEST NO. 432-1 EMISSIONS RESULTS

PVH - 432 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 432-11 RUN 1
VEHICLE MODEL 79 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

VEHICLE NO. 93
DATE 1/ 3/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 6618 KM(4112 MILES)

BAROMETER 757.17 MM HG(29.81 IN HG)
RELATIVE HUMIDITY 28 PCT

DRY BULB TEMP. 20.6 DEG C(69.0 DEG F)
ABS. HUMIDITY 9.2 GM/KG

NOX HUMIDITY CORRECTION FACTOR .82

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP, DEG. C(DEG. F)	36.1 (115.0)	39.4 (103.0)	39.4 (112.0)	43.3 (110.0)
BLOWER REVOLUTIONS	40599	64700	40905	64669
CVS FLOW STD, CU. METRES(SCF)	77.9 (2750.4)	134.8 (4759.7)	77.9 (2739.2)	133.7 (4723.0)
HC SAMPLE METER/RANGE/PPM	59.2/ 2/ 59	13.8/ 2/ 14	22.6/ 2/ 23	10.0/ 2/ 10
HC BCKGRD METER/RANGE/PPM	15.7/ 2/ 16	13.8/ 2/ 14	10.8/ 2/ 11	10.0/ 2/ 10
CO SAMPLE METER/RANGE/PPM	38.4/11/ 384	97.8/13/ 95	62.0/12/ 139	13.9/13/ 13
CO BCKGRD METER/RANGE/PPM	11.1/11/ 95	27.0/13/ 26	4.7/12/ 8	6.9/13/ 6
CO2 SAMPLE METER/RANGE/PCT	49.5/ 3/ 1.15	38.2/ 3/ .44	58.2/ 3/ 1.03	41.1/ 3/ .76
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .06	3.4/ 3/ .06	3.4/ 3/ .06	3.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	9.7/ 2/ 10	1.8/ 2/ 2	7.6/ 2/ 8	2.5/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	.5/ 2/ 1	.5/ 2/ 1	.9/ 2/ 0	.5/ 2/ 1
DILUTION FACTOR	11.20	20.61	12.05	19.13
HC CONCENTRATION PPM	95	1	13	1
CO CONCENTRATION PPM	390	20	187	7
CO2 CONCENTRATION PCT	1.10	.59	.97	.69
NOX CONCENTRATION PPM	4.2	1.3	7.1	2.0
HC MASS GRAMS	2.02	.05	.56	.09
CO MASS GRAMS	30.86	3.80	11.96	1.05
CO2 MASS GRAMS	1569.7	1999.8	1978.1	1967.9
NOX MASS GRAMS	1.14	.28	.87	.93
HC GRAMS/KM	.39	.01	.10	.01
CO GRAMS/KM	5.27	.51	1.95	.17
CO2 GRAMS/KM	267.8	271.0	239.0	244.1
NOX GRAMS/KM	.19	.04	.15	.07
FUEL CONSUMPTION BY CB L/100KM	11.74	9.40	10.13	10.69
RUN TIME SECONDS	509	868	503	868
AVG. EXH. OXYGEN PERCENT	1.99	.36	.88	.39
CATALYST AVG. TEMP. DEG. C	-	-	-	-
CATALYST MAX. TEMP. DEG. C	678	550	687	593
MEASURED DISTANCE KM	5.84	6.88	5.84	6.29
DFC, WET (DRY)	.937 (.939)		.938 (.936)	
SCF, WET (DRY)	1.000 (.998)		1.000 (.998)	
VOL (SCM)	212.6		211.1	
KM (MEASURED)	12.19		12.18	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	432-11	TOTAL FUEL SULFUR MG/KM	22.19	CARBON DIOXIDE G/KM	239.3	(244.6)
BAROMETER MM HG	757.2	AVG. EXH. OXYGEN PCT	.73	FUEL CONSUMPTION L/100KM	10.26	(10.57)
HUMIDITY G/KG	9.2	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.10	(.10)
TEMPERATURE DEG C	20.6	CATALYST MAX. TEMP. DEG C	-	CARBON MONOXIDE G/KM	1.84	(1.74)
				OXIDES OF NITROGEN G/KM	.10	(.11)

PVH - 432 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 79 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	432-12	432-13
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	1/ 3/79	1/ 3/79 / /
ODOMETER	6649KM(4131MILES)	6703KM(4165MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	22.8 / 73.0	24.1 / 74.0
RELATIVE HUMIDITY, PCT	19.3	9.2
BAROMETER, MM HG(IN HG)	756.9 (29.80)	755.6 (29.75)
RUN TIME, SECONDS	1347	771
BLOWER DIF P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM, H2O(IN, H2O)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP, DEG. C(DEG. F)	36.1 (115.0)	39.4 (112.0)
BLOWER REVOLUTIONS	112172	61858
CVS FLOW STD, CU. METRES(SCF)	215.9 (7607.1)	118.3 (4176.6)
HC SAMPLE METER/RANGE/PPM	15.0/ 2/ 15	31.5/ 2/ 31
HC BCKGRD METER/RANGE/PPM	10.1/ 2/ 10	31.5/ 2/ 31
CO SAMPLE METER/RANGE/PPM	55.7/12/ 124	88.0/12/ 196
CO BCKGRD METER/RANGE/PPM	1.3/12/ 3	1.0/12/ 2
CO2 SAMPLE METER/RANGE/PCT	70.0/ 3/ 1.26	89.0/ 3/ 1.67
CO2 BCKGRD METER/RANGE/PCT	3.0/ 3/ .06	4.9/ 3/ .09
NOX SAMPLE METER/RANGE/PPM	5.3/ 2/ 5	4.8/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ 0	.9/ 2/ 0
HC CONCENTRATION PPM	6	9
CO CONCENTRATION PPM	118	139
CO2 CONCENTRATION PCT	1.21	1.61
NOX CONCENTRATION PPM	5.0	6.5
HC MASS GRAMS	.73	.27
CO MASS GRAMS	29.57	14.14
CO2 MASS GRAMS	4778.3	3947.3
NOX MASS GRAMS	1.67	1.13
DFC, WET (DRY)	.905 (.905)	.879 (.879)
SCF, WET (DRY)	1.000 (.988)	1.000 (.985)
VOL (SCM)	215.9	118.3
KM (MEASURED)	22.19	16.79
TEST NUMBER, PVH-ST	432-12	432-13
BAROMETER, MM HG	756.9	755.6
HUMIDITY, G/KG	3.3	1.9
TEMPERATURE, DEG C	22.8	24.1
TOTAL FUEL SULFUR, MG/KM	19.95	19.28
AVG. EXH. OXYGEN, PCT	.16	.02
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	-	-
CARBON DIOXIDE, G/KM	215.9	288.9
FUEL CONSUMPTION, L/100KM	9.91	9.00
HYDROCARBONS, G/KM	.03	.02
CARBON MONOXIDE, G/KM	1.34	1.15
OXIDES OF NITROGEN, G/KM	.08	.07

TABLE E-29. TEST NO. 432-2 EMISSIONS RESULTS

PVH - 432 . FTP VEHICLE EMISSIONS RESULTS - 12 PCT MISFIRE
PROJECT 11-4489-001

TEST NO. 432-21 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

VEHICLE NO. 93
DATE 1/ 8/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399
ODOMETER 7862 KM(4888 MILES)

BAROMETER 758.78 MM HG(29.87 IN HG)
RELATIVE HUMIDITY 16 PCT

DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
ABS. HUMIDITY 2.6 GM/KG

NOX HUMIDITY CORRECTION FACTOR .79

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H20(IN. H20)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	35.6 (116.0)	35.0 (113.0)
BLOWER REVOLUTIONS	90991	64661	90919	64539
CVS FLOW STD. CU. METRES(SCF)	77.9 (2751.6)	139.0 (4933.6)	77.7 (2745.7)	139.6 (4919.0)
HC SAMPLE METER/RANGE/PPM	42.6/ 3/ 424	16.6/ 3/ 166	28.8/ 3/ 288	16.9/ 3/ 169
HC BCKGRD METER/RANGE/PPM	1.6/ 3/ 16	1.2/ 3/ 12	1.2/ 3/ 12	1.3/ 3/ 13
CO SAMPLE METER/RANGE/PPM	93.2/ 3/ 1039	89.1/11/ 397	30.9/ 3/ 711	87.3/11/ 391
CO BCKGRD METER/RANGE/PPM	.8/ 3/ 18	5.8/11/ 18	.6/ 3/ 14	4.3/11/ 20
CO2 SAMPLE METER/RANGE/PCT	79.0/ 3/ 1.35	99.1/ 3/ .75	69.5/ 3/ 1.15	99.1/ 3/ .75
CO2 BCKGRD METER/RANGE/PCT	9.8/ 3/ .06	9.5/ 3/ .07	9.6/ 3/ .07	9.1/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	9.3/ 2/ 9	1.6/ 2/ 2	5.1/ 2/ 5	2.0/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ 0	.1/ 2/ 0	.3/ 2/ 0	.9/ 2/ 0
DILUTION FACTOR	9.88	16.54	10.71	16.56
HC CONCENTRATION PPM	910	155	277	152
CO CONCENTRATION PPM	991	372	479	364
CO2 CONCENTRATION PCT	1.29	.69	1.09	.68
NOX CONCENTRATION PPM	9.1	1.5	4.8	1.4
HC MASS GRAMS	18.91	11.46	12.93	11.78
CO MASS GRAMS	84.87	58.03	61.42	56.88
CO2 MASS GRAMS	1838.5	1642.9	1550.0	1665.6
NOX MASS GRAMS	1.07	.30	.56	.33
HC GRAMS/KM	3.11	1.90	2.12	1.85
CO GRAMS/KM	15.19	9.29	10.96	8.96
CO2 GRAMS/KM	310.8	264.5	264.0	263.3
NOX GRAMS/KM	.18	.05	.10	.05
FUEL CONSUMPTION BY CB L/100KM	19.78	12.38	12.25	12.04
RUN TIME SECONDS	504	868	503	867
AVG. EXH. OXYGEN PERCENT	-	1.17	-	1.18
CATALYST AVG. TEMP. DEG. C	-	-	-	-
CATALYST MAX. TEMP. DEG. C	-	-	-	-
MEASURED DISTANCE KM	5.92	6.28	5.87	6.33
DFC, WET (DRY)	.921 (.921)		.927 (.927)	
SCF, WET (DRY)	1.000 (.991)		1.000 (.992)	
VOL (SCM)	211.9		211.3	
KM (MEASURED)	12.20		12.20	

COMPOSITE RESULTS

			3-BAG	(4-BAG)
TEST NUMBER	432-21	CARBON DIOXIDE G/KM	276.6	(279.8)
BAROMETER MM HG	758.9	FUEL CONSUMPTION L/100KM	12.83	(12.79)
HUMIDITY G/KG	2.5	HYDROCARBONS (THC) G/KM	2.21	(2.20)
TEMPERATURE DEG C	22.2	CARBON MONOXIDE G/KM	10.92	(10.73)
TOTAL FUEL SULFUR MG/KM	27.99	OXIDES OF NITROGEN G/KM	.04	(.04)
AVG. EXH. OXYGEN PCT	-			
CATALYST AVG. TEMP. DEG C	-			
CATALYST MAX. TEMP. DEG C	-			

PVH - 432 SBT VEHICLE EMISSIONS RESULTS - 12 PCT MISFIRE
PROJECT 11-4489-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399

TEST NUMBER	432-22	432-23
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	1/ 8/79	1/ 8/79 / /
ODOMETER	7849KM(4907MILES)	7933KM(4932MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	22.2 / 72.0	23.9 / 75.0
RELATIVE HUMIDITY, PCT	18.1	15.6
BAROMETER, MM HG(IN HG)	755.9 (29.76)	755.1 (29.73)
RUN TIME, SECONDS	1398	770
BLOWER DIF P MM. H20(IN. H20)	812.8 (32.0)	812.8 (32.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	44.4 (112.0)
BLOWER REVOLUTIONS	118285	61863
CVS FLOW STD. CU. METRES(SCF)	219.7 (7589.4)	118.2 (4179.2)
HC SAMPLE METER/RANGE/PPM	31.1/ 3/ 311	38.4/ 3/ 384
HC BCKGRD METER/RANGE/PPM	1.4/ 3/ 14	1.4/ 3/ 14
CO SAMPLE METER/RANGE/PPM	39.7/ 3/ 997	61.5/ 3/ 1265
CO BCKGRD METER/RANGE/PPM	1.3/ 3/ 29	2.6/ 3/ 59
CO2 SAMPLE METER/RANGE/PCT	76.5/ 3/ 1.48	41.1/ 3/ 1.70
CO2 BCKGRD METER/RANGE/PCT	9.8/ 3/ .07	7.0/ 3/ .11
NOX SAMPLE METER/RANGE/PPM	5.2/ 2/ 5	5.4/ 2/ 6
NOX BCKGRD METER/RANGE/PPM	.3/ 2/ 0	.9/ 2/ 0
HC CONCENTRATION PPM	299	368
CO CONCENTRATION PPM	891	1147
CO2 CONCENTRATION PCT	1.33	1.61
NOX CONCENTRATION PPM	4.9	5.6
HC MASS GRAMS	36.98	25.06
CO MASS GRAMS	222.73	168.57
CO2 MASS GRAMS	5238.0	3980.1
NOX MASS GRAMS	1.60	1.00
DFC, WET (DRY)	.887 (.887)	.861 (.861)
SCF, WET (DRY)	1.000 (.987)	1.000 (.984)
VOL (SCM)	219.7	118.2
KM (MEASURED)	22.24	10.66
TEST NUMBER, PVH-ST	432-22	432-23
BAROMETER, MM HG	755.9	755.1
HUMIDITY, G/KG	2.5	2.4
TEMPERATURE, DEG C	22.2	23.9
TOTAL FUEL SULFUR, MG/KM	25.92	28.43
AVG. EXH. OXYGEN, PCT	-	.21
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	-	-
CARBON DIOXIDE, G/KM	235.0	208.9
FUEL CONSUMPTION, L/100KM	10.93	9.77
HYDROCARBONS, G/KM	1.66	1.50
CARBON MONOXIDE, G/KM	9.99	9.69
OXIDES OF NITROGEN, G/KM	.07	.04

TABLE E-30. TEST NO. 432-3 EMISSIONS RESULTS

PVH - 932 FTP VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-9989-001

TEST NO. 932-31 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

VEHICLE NO. 93
DATE 1/11/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 7295 KM(9533 MILES)

BAROMETER 739.19 MM HG(29.10 IN HG)
RELATIVE HUMIDITY 31 PCT
DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
ABS. HUMIDITY 6.9 GM/KG

NOX HUMIDITY CORRECTION FACTOR .88

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)	799.3 (29.5)
BLOWER INLET P MM. H2O(IN. H2O)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)	723.9 (28.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.9 (111.0)	44.4 (112.0)	43.9 (110.0)	43.9 (111.0)
BLOWER REVOLUTIONS	98707	69666	98680	69686
CVS FLOW STD. CU. METRES(SCF)	74.3 (2645.9)	130.9 (9607.9)	74.2 (2640.9)	130.6 (9613.6)
HC SAMPLE METER/RANGE/PPM	90.6/ 3/ 984	15.6/ 3/ 164	30.0/ 3/ 300	15.9/ 3/ 159
HC BCKGRD METER/RANGE/PPM	1.2/ 3/ 12	1.3/ 3/ 13	1.2/ 3/ 12	1.3/ 3/ 13
CO SAMPLE METER/RANGE/PPM	95.0/ 3/ 1087	84.9/11/ 983	34.3/ 3/ 388	82.5/11/ 395
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	.6/11/ 8	.1/ 3/ 2	.4/11/ 3
CO2 SAMPLE METER/RANGE/PCT	74.4/ 3/ 1.3h	95.4/ 3/ .79	66.3/ 3/ 1.19	99.1/ 3/ .75
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.6/ 3/ .06	3.5/ 3/ .05	3.9/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	8.1/ 3/ 9	1.8/ 2/ 2	3.4/ 3/ 9	1.8/ 2/ 2
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 1	.6/ 2/ 1	.6/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	8.88	15.84	10.33	16.58
HC CONCENTRATION PPM	345	144	284	147
CO CONCENTRATION PPM	1045	341	780	373
CO2 CONCENTRATION PCT	1.32	.79	1.19	.71
NOX CONCENTRATION PPM	7.7	1.8	3.9	1.1
HC MASS GRAMS	17.90	10.82	12.71	11.04
CO MASS GRAMS	92.84	84.96	69.19	84.69
CO2 MASS GRAMS	1898.0	1760.5	1591.6	1687.9
NOX MASS GRAMS	.98	.27	.93	.25
HC GRAMS/KM	2.45	1.71	2.15	1.75
CO GRAMS/KM	15.73	9.38	11.73	8.95
CO2 GRAMS/KM	318.9	277.7	269.8	266.9
NOX GRAMS/KM	.17	.04	.07	.04
FUEL CONSUMPTION BY CB L/100KM	19.81	12.71	12.60	12.21
RUN TIME SECONDS	505	870	505	868
AVG. EXH. OXYGEN PERCENT	.63	.60	.56	.59
CATALYST AVG. TEMP. DEG. C	593	661	632	652
CATALYST MAX. TEMP. DEG. C	836	708	884	695
MEASURED DISTANCE KM	5.91	6.39	5.90	6.39
DFC, WET (DRY)	.919 (.916)		.926 (.923)	
SCF, WET (DRY)	1.000 (.997)		1.000 (.988)	
VOL (SCM)	206.8		206.8	
KM (MEASURED)	12.29		12.29	

COMPOSITE RESULTS

TEST NUMBER		932-31
BAROMETER	MM HG	739.1
HUMIDITY	G/KG	6.9
TEMPERATURE	DEG C	25.6

TOTAL FUEL SULFUR	MG/KM	28.11
AVG. EXH. OXYGEN	PCT	.59
CATALYST AVG. TEMP.	DEG C	-
CATALYST MAX. TEMP.	DEG C	-

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	282.9	(279.5)
FUEL CONSUMPTION	L/100KM	13.12	(12.97)
HYDROCARBONS (THC)	G/KM	2.09	(2.10)
CARBON MONOXIDE	G/KM	11.39	(11.21)
OXIDES OF NITROGEN	G/KM	.08	(.08)

PVH - 932 SBT VEHICLE EMISSIONS RESULTS - 12 PCT. MISFIRE
PROJECT 11-9989-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1720 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

	932-32	932-33
TEST NUMBER	932-32	932-33
TEST CYCLE	SBT	HFET
RUN NUMBER	1	1
DATE	1/10/79	1/10/79 / /
ODOMETER	7282KM(9975MILES)	7290KM(9986MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.6 / 78.0	25.6 / 78.0
RELATIVE HUMIDITY, PCT	33.6	33.6
BAROMETER, MM HG(IN HG)	745.0 (29.33)	745.0 (29.33)
RUN TIME, SECONDS	1997	772
BLOWER DIF P MM. H2O(IN. H2O)	787.9 (31.0)	787.9 (31.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	44.4 (112.0)	44.4 (112.0)
BLOWER REVOLUTIONS	112287	42895
CVS FLOW STD. CU. METRES(SCF)	211.5 (7471.3)	116.4 (4128.3)
HC SAMPLE METER/RANGE/PPM	29.1/ 3/ 291	35.7/ 3/ 357
HC BCKGRD METER/RANGE/PPM	1.3/ 3/ 13	1.6/ 3/ 16
CO SAMPLE METER/RANGE/PPM	37.6/ 3/ 842	98.8/ 3/ 1148
CO BCKGRD METER/RANGE/PPM	.5/ 3/ 11	1.3/ 3/ 29
CO2 SAMPLE METER/RANGE/PCT	76.3/ 3/ 1.34	88.0/ 3/ 1.64
CO2 BCKGRD METER/RANGE/PCT	4.3/ 3/ .07	5.5/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	4.5/ 3/ 5	4.4/ 2/ 5
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.2/ 2/ 1
HC CONCENTRATION PPM	274	343
CO CONCENTRATION PPM	844	1119
CO2 CONCENTRATION PCT	1.33	1.64
NOX CONCENTRATION PPM	3.6	3.9
HC MASS GRAMS	39.10	23.13
CO MASS GRAMS	209.10	151.67
CO2 MASS GRAMS	5198.7	3395.3
NOX MASS GRAMS	1.27	.77
DFC, WET (DRY)	.887 (.884)	.867 (.863)
SCF, WET (DRY)	1.000 (.983)	1.000 (.980)
VOL (SCM)	211.5	116.9
KM (MEASURED)	22.09	14.71

TEST NUMBER,	PVH-ST	932-32	932-33
BAROMETER,	MM HG	745.0	745.0
HUMIDITY,	G/KG	7.0	7.0
TEMPERATURE,	DEG C	25.6	25.6
TOTAL FUEL SULFUR,	MG/KM	23.13	28.01
AVG. EXH. OXYGEN,	PCT	.62	.45
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	233.1	208.1
FUEL CONSUMPTION,	L/100KM	10.74	9.39
HYDROCARBONS,	G/KM	1.54	1.38
CARBON MONOXIDE,	G/KM	9.47	9.87
OXIDES OF NITROGEN,	G/KM	.06	.05

TABLE E-31. TEST NO. 434-1 EMISSIONS RESULTS

PVM - 434 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4484-001

TEST NO. 434-11 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

VEHICLE NO. 43
DATE 2/15/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399
ODOMETER 11936 KM(7186 MILES)

BAROMETER 734.34 MM HG(29.11 IN HG)
RELATIVE HUMIDITY 57 PCT
DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
ABS. HUMIDITY 12.4 GM/KG
NOX HUMIDITY CORRECTION FACTOR 1.04

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	42.8 (109.0)	42.8 (109.0)	42.8 (109.0)	42.8 (109.0)
BLOWER REVOLUTIONS	98643	69755	98643	69643
CVS FLOW STD. CU. METRES(SCF)	74.3 (2625.8)	130.8 (4620.9)	76.1 (2688.9)	130.7 (4614.3)
HC SAMPLE METER/RANGE/PPM	53.7/ 2/ 59	29.5/ 2/ 29	22.5/ 2/ 23	11.7/ 2/ 12
HC BCKGRD METER/RANGE/PPM	31.0/ 2/ 31	29.5/ 2/ 29	11.8/ 2/ 12	11.7/ 2/ 12
CO SAMPLE METER/RANGE/PPM	41.0/11/ 454	33.1/13/ 31	72.3/12/ 169	20.9/13/ 21
CO BCKGRD METER/RANGE/PPM	3.6/11/ 11	10.3/13/ 10	3.2/12/ 6	9.2/13/ 9
CO2 SAMPLE METER/RANGE/PCT	64.6/ 3/ 1.15	40.9/ 3/ .69	61.9/ 3/ 1.10	43.3/ 3/ .79
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .05	9.0/ 3/ .06	3.9/ 3/ .05	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	7.0/ 2/ 7	1.5/ 2/ 2	8.5/ 2/ 9	1.0/ 2/ 1
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	.8/ 2/ 1	.8/ 2/ 1	.7/ 2/ 1
DILUTION FACTOR	11.13	19.34	11.98	18.89
HC CONCENTRATION PPM	25	2	12	1
CO CONCENTRATION PPM	425	21	153	17
CO2 CONCENTRATION PCT	1.11	.63	1.05	.68
NOX CONCENTRATION PPM	4.2	.7	7.8	.7
HC MASS GRAMS	1.12	.11	.51	.05
CO MASS GRAMS	37.88	3.21	13.53	2.55
CO2 MASS GRAMS	1598.8	1501.9	1968.2	1639.6
NOX MASS GRAMS	.46	.20	1.20	.20
HC GRAMS/KM	.19	.02	.09	.01
CO GRAMS/KM	6.44	.51	2.30	.40
CO2 GRAMS/KM	269.7	238.4	299.7	256.8
NOX GRAMS/KM	.16	.03	.20	.03
FUEL CONSUMPTION BY CB L/100KM	11.71	10.23	10.92	10.44
RUN TIME SECONDS	505	868	505	869
AVG. EXH. OXYGEN PERCENT	1.50	1.52	1.50	1.50
CATALYST AVG. TEMP. DEG. C	533	562	582	599
CATALYST MAX. TEMP. DEG. C	761	618	739	610
MEASURED DISTANCE KM	5.87	6.24	5.98	6.36
DFC, WET (DRY)	.939 (.923)		.939 (.923)	
SCF, WET (DRY)	1.000 (.980)		1.000 (.980)	
VOL (SCM)	207.1		206.8	
KM (MEASURED)	12.16		12.29	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	434-11	TOTAL FUEL SULFUR MG/KM	22.43	CARBON DIOXIDE G/KM	297.6	(292.3)
BAROMETER MM HG	739.4	AVG. EXH. OXYGEN PCT	1.51	FUEL CONSUMPTION L/100KM	10.70	(10.43)
HUMIDITY G/KG	12.4	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.07	(.07)
TEMPERATURE DEG C	26.1	CATALYST MAX. TEMP. DEG C	-	CARBON MONOXIDE G/KM	2.23	(2.20)
				OXIDES OF NITROGEN G/KM	.11	(.11)

PVM - 434 SBT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-4484-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 43
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399

TEST NUMBER	434-12	434-13
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	2/14/79	2/15/79 / /
ODOMETER	11468KM(7126MILES)	11505KM(7149MILES)
CVS, - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	26.1 / 79.0	26.7 / 80.0
RELATIVE HUMIDITY, PCT	53.6	54.2
BAROMETER, MM HG(IN HG)	739.4 (29.12)	739.4 (29.12)
RUN TIME, SECONDS	1397	765
BLOWER DIF P MM. H20(IN. H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H20(IN. H20)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	43.3 (110.0)
BLOWER REVOLUTIONS	112867	61939
CVS FLOW STD. CU. METRES(SCF)	210.9 (7931.9)	115.2 (4067.1)
HC SAMPLE METER/RANGE/PPM	15.2/ 2/ 15	19.6/ 2/ 20
HC BCKGRD METER/RANGE/PPM	9.8/ 2/ 10	11.6/ 2/ 12
CO SAMPLE METER/RANGE/PPM	57.6/12/ 128	99.9/12/ 232
CO BCKGRD METER/RANGE/PPM	1.3/12/ 2	1.8/12/ 3
CO2 SAMPLE METER/RANGE/PCT	72.1/ 3/ 1.31	86.0/ 3/ 1.59
CO2 BCKGRD METER/RANGE/PCT	3.3/ 3/ .05	3.0/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	3.9/ 2/ 4	9.3/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.7/ 2/ 1	.8/ 2/ 1
HC CONCENTRATION PPM	6	9
CO CONCENTRATION PPM	121	219
CO2 CONCENTRATION PCT	1.26	1.55
NOX CONCENTRATION PPM	3.3	3.6
HC MASS GRAMS	.77	.42
CO MASS GRAMS	29.59	24.25
CO2 MASS GRAMS	4961.8	3277.4
NOX MASS GRAMS	1.36	.93
DFC, WET (DRY)	.901 (.892)	.874 (.870)
SCF, WET (DRY)	1.000 (.977)	1.000 (.979)
VOL (SCM)	210.9	115.2
KM (MEASURED)	28.03	16.81

TEST NUMBER,	PVM-ST	434-12	434-13
BAROMETER,	MM HG	739.4	739.4
HUMIDITY,	G/KG	11.7	12.2
TEMPERATURE,	DEG C	26.1	26.7
TOTAL FUEL SULFUR,	MG/KM	28.39	18.18
AVG. EXH. OXYGEN,	PCT	.85	1.26
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	228.7	195.0
FUEL CONSUMPTION,	L/100KM	9.81	8.99
HYDROCARBONS,	G/KM	.09	.04
CARBON MONOXIDE,	G/KM	1.34	1.74
OXIDES OF NITROGEN,	G/KM	.04	.05

TABLE E-32. TEST NO. 434-2 EMISSIONS RESULTS

PVM - 434 FTP VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4484-001

TEST NO. 434-81 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

VEHICLE NO. 43
DATE 9/ 6/78
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 11872 KM(7377 MILES)

BAROMETER 996.76 MM HG(29.40 IN HG)
RELATIVE HUMIDITY 54 PCT
DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
ABS. HUMIDITY 9.9 GM/KG
NOX HUMIDITY CORRECTION FACTOR .96

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET TEMP, DEG, C(DEG, F)	93.3 (110.0)	93.3 (110.0)	93.3 (110.0)	93.3 (110.0)
BLOWER REVOLUTIONS	98675	64695	98892	64899
CVS FLOW STD, CU, METRES(SCF)	76.7 (2707.8)	131.3 (9638.9)	76.3 (2695.1)	131.2 (9639.6)
HC SAMPLE METER/RANGE/PPM	24.3/ 2/ 75	16.2/ 2/ 16	32.5/ 2/ 33	16.5/ 2/ 16
HC BCKGRD METER/RANGE/PPM	15.6/ 2/ 16	16.2/ 2/ 16	15.7/ 2/ 16	16.5/ 2/ 16
CO SAMPLE METER/RANGE/PPM	95.6/11/ 996	32.8/13/ 31	82.7/12/ 193	22.6/13/ 21
CO BCKGRD METER/RANGE/PPM	3.2/11/ 10	8.3/13/ 8	6.7/12/ 12	5.3/13/ 5
CO2 SAMPLE METER/RANGE/PCT	68.7/ 3/ 1.29	95.0/ 3/ .77	69.2/ 3/ 1.15	93.7/ 3/ .75
CO2 BCKGRD METER/RANGE/PCT	9.2/ 3/ .06	9.9/ 3/ .08	9.5/ 3/ .07	9.5/ 3/ .08
NOX SAMPLE METER/RANGE/PPM	9.2/ 2/ 9	3.7/ 2/ 9	7.9/ 2/ 8	3.6/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	1.5/ 2/ 2	1.2/ 2/ 1	1.1/ 2/ 1	1.9/ 2/ 1
DILUTION FACTOR	10.39	17.26	11.99	17.85
HC CONCENTRATION PPM	61	1	18	1
CO CONCENTRATION PPM	963	29	179	16
CO2 CONCENTRATION PCT	1.18	.76	1.08	.67
NOX CONCENTRATION PPM	7.8	2.6	6.9	2.3
HC MASS GRAMS	2.68	.07	.80	.07
CO MASS GRAMS	41.66	3.95	15.98	2.99
CO2 MASS GRAMS	1656.0	1685.0	1519.9	1603.0
NOX MASS GRAMS	1.10	.62	.93	.55
HC GRAMS/KM	.97	.01	.19	.01
CO GRAMS/KM	7.27	.56	2.78	.40
CO2 GRAMS/KM	289.0	294.9	264.1	281.3
NOX GRAMS/KM	.19	.10	.17	.09
FUEL CONSUMPTION BY CB L/100KM	12.84	11.78	11.97	11.18
RUN TIME, SECONDS	505	868	505	869
AVG. EXH. OXYGEN, PERCENT	.91	.88	.69	.87
CATALYST AVG. TEMP. DEG. C	553	562	552	538
CATALYST MAX. TEMP. DEG. C	782	623	730	588
MEASURED DISTANCE KM	5.73	6.14	5.73	6.13
DFC, WET (DRY)	.928 (.918)		.933 (.922)	
SCF, WET (DRY)	1.000 (.990)		1.000 (.981)	
VOL (SCM)	208.0		207.6	
KM (MEASURED)	11.87		11.87	

COMPOSITE RESULTS

TEST NUMBER		434-81
BAROMETER	MM HG	996.8
HUMIDITY	G/KG	9.9
TEMPERATURE	DEG C	22.8

TOTAL FUEL SULFUR	MG/KM	25.52
AVG. EXH. OXYGEN	PCT	.85
CATALYST AVG. TEMP.	DEG C	-
CATALYST MAX. TEMP.	DEG C	-

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	279.6	(278.7)
FUEL CONSUMPTION	L/100KM	11.91	(11.79)
HYDROCARBONS (THC)	G/KM	.19	(.19)
CARBON MONOXIDE	G/KM	2.59	(2.49)
OXIDES OF NITROGEN	G/KM	.19	(.19)

PVM - 434 SBT VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-4484-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 43
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.4 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	434-22	434-23
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	9/ 6/78	9/ 6/78 / /
ODOMETER	11486KM(7398MILES)	11495KM(7922MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	27.2 / 81.0	26.1 / 79.0
RELATIVE HUMIDITY, PCT	41.8	37.3
BAROMETER, MM HG(IN HG)	747.5 (29.43)	747.5 (29.43)
RUN TIME, SECONDS	1347	766
BLOWER DIF P MM, H2O(IN, H2O)	787.4 (31.0)	787.4 (31.0)
BLOWER INLET P MM, H2O(IN, H2O)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET TEMP, DEG, C(DEG, F)	93.3 (110.0)	93.3 (110.0)
BLOWER REVOLUTIONS	112055	61989
CVS FLOW STD, CU, METRES(SCF)	211.9 (7486.6)	116.8 (4047.3)
HC SAMPLE METER/RANGE/PPM	22.4/ 2/ 23	25.5/ 2/ 25
HC BCKGRD METER/RANGE/PPM	16.0/ 2/ 16	17.1/ 2/ 17
CO SAMPLE METER/RANGE/PPM	62.3/12/ 139	73.3/12/ 167
CO BCKGRD METER/RANGE/PPM	1.8/12/ 3	1.6/12/ 3
CO2 SAMPLE METER/RANGE/PCT	73.6/ 3/ 1.39	91.8/ 3/ 1.70
CO2 BCKGRD METER/RANGE/PCT	9.3/ 3/ .08	9.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	7.7/ 2/ 8	4.9/ 2/ 4
NOX BCKGRD METER/RANGE/PPM	1.1/ 2/ 1	1.1/ 2/ 1
HC CONCENTRATION PPM	9	11
CO CONCENTRATION PPM	131	157
CO2 CONCENTRATION PCT	1.26	1.65
NOX CONCENTRATION PPM	6.7	5.4
HC MASS GRAMS	1.09	.71
CO MASS GRAMS	32.30	21.19
CO2 MASS GRAMS	4844.7	3510.9
NOX MASS GRAMS	2.62	1.11
DFC, WET (DRY)	.899 (.893)	.872 (.867)
SCF, WET (DRY)	1.000 (.981)	1.000 (.979)
VOL (SCM)	211.9	116.8
KM (MEASURED)	21.96	16.37

TEST NUMBER,	PVM-BT	434-22	434-23
BAROMETER,	MM HG	747.5	747.5
HUMIDITY,	G/KG	9.6	8.0
TEMPERATURE,	DEG C	27.2	26.1
TOTAL FUEL SULFUR,	MG/KM	21.09	19.82
AVG. EXH. OXYGEN,	PCT	.96	-
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	228.1	219.5
FUEL CONSUMPTION,	L/100KM	9.89	9.25
HYDROCARBONS,	G/KM	.05	.04
CARBON MONOXIDE,	G/KM	1.51	1.29
OXIDES OF NITROGEN,	G/KM	.12	.07

TABLE E-33. TEST NO. 434-3 EMISSIONS RESULTS

PVM - 439 FTP VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-9989-001

TEST NO. 439-31 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

VEHICLE NO. 93
DATE 9/18/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399
ODOMETER 11495 KM(7141 MILES)

BAROMETER 733.38 MM HG(28.87 IN HG)
RELATIVE HUMIDITY 57 PCT

DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
ABS. HUMIDITY 12.0 GM/KG

NOX HUMIDITY CORRECTION FACTOR 1.05

BAG RESULTS

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)	33.3 (110.0)
BLOWER REVOLUTIONS	49685	64995	49619	64925
CVS FLOW STD. CU. METRES(SCF)	75.3 (2659.5)	129.2 (4565.1)	75.2 (2659.9)	129.0 (4557.1)
HC SAMPLE METER/RANGE/PPM	68.4/ 2/ 68	17.0/ 2/ 17	26.8/ 2/ 27	17.2/ 2/ 17
HC BCKGRD METER/RANGE/PPM	16.9/ 2/ 16	16.7/ 2/ 17	17.0/ 2/ 17	17.2/ 2/ 17
CO SAMPLE METER/RANGE/PPM	88.1/11/ 929	38.0/13/ 36	56.7/12/ 126	19.4/13/ 19
CO BCKGRD METER/RANGE/PPM	4.2/11/ 13	10.0/13/ 10	3.3/12/ 6	5.9/13/ 6
CO2 SAMPLE METER/RANGE/PCT	69.1/ 3/ 1.25	99.3/ 3/ .76	62.2/ 3/ 1.11	93.0/ 3/ .73
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .06	3.7/ 3/ .06	3.9/ 3/ .06	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	8.4/ 2/ 8	3.0/ 2/ 3	6.3/ 2/ 6	3.3/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	1.3/ 2/ 1	.8/ 2/ 1	.5/ 2/ 1	.5/ 2/ 1
DILUTION FACTOR	18.34	17.55	11.95	18.17
HC CONCENTRATION PPM	59	1	11	1
CO CONCENTRATION PPM	399	26	116	13
CO2 CONCENTRATION PCT	1.19	.70	1.05	.68
NOX CONCENTRATION PPM	7.2	2.2	5.8	2.8
HC MASS GRAMS	2.33	.09	.99	.07
CO MASS GRAMS	35.03	3.89	10.14	1.95
CO2 MASS GRAMS	1643.5	1668.3	1958.8	1603.8
NOX MASS GRAMS	1.09	.58	.88	.73
HC GRAMS/KM	.91	.02	.09	.01
CO GRAMS/KM	6.11	.63	1.77	.32
CO2 GRAMS/KM	286.7	271.5	253.9	264.0
NOX GRAMS/KM	.19	.09	.15	.12
FUEL CONSUMPTION BY CB L/100KM	12.70	11.63	10.96	11.24
RUN TIME SECONDS	505	869	506	868
AVG. EXH. OXYGEN PERCENT	.89	.72	.60	.69
CATALYST AVG. TEMP. DEG. C	539	583	562	599
CATALYST MAX. TEMP. DEG. C	761	618	773	606
MEASURED DISTANCE KM	5.73	6.19	5.72	6.08
DFC, WET (DRY)	.928 (.917)		.929 (.923)	
SCF, WET (DRY)	1.000 (.474)		1.000 (.985)	
VOL (SCM)	209.5		209.6	
KM (MEASURED)	11.88		11.90	

COMPOSITE RESULTS

						3-BAG	(4-BAG)
TEST NUMBER	439-31	TOTAL FUEL SULFUR	MG/KM 25.00	CARBON DIOXIDE	G/KM	269.7	(267.4)
BAROMETER MM HG	733.3	AVG. EXH. OXYGEN	PCT .72	FUEL CONSUMPTION	L/100KM	11.47	(11.56)
HUMIDITY G/KG	12.0	CATALYST AVG. TEMP.	DEG C -	HYDROCARBONS (THC)	G/KM	.12	(.11)
TEMPERATURE DEG C	25.6	CATALYST MAX. TEMP.	DEG C -	CARBON MONOXIDE	G/KM	2.08	(1.99)
				OXIDES OF NITROGEN	G/KM	.13	(.19)

PVM - 439 SBT VEHICLE EMISSIONS RESULTS - HIGH OIL CONSUMPTION
PROJECT 11-9989-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399

TEST NUMBER		439-32	439-33
TEST CYCLE		SET	HFET
RUN NUMBER		1	1
DATE		9/18/79	9/18/79 / /
ODOMETER		12019KM(7465MILES)	12043KM(7483MILES)
CVS - BAG CART - DYNAMOMETER		2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)		26.7 / 80.0	26.7 / 80.0
RELATIVE HUMIDITY, PCT		58.4	59.3
BAROMETER, MM HG(IN HG)		735.8 (28.97)	730.5 (28.76)
RUN TIME, SECONDS		1398	766
BLOWER DIF P MM. H2O(IN. H2O)		779.7 (30.5)	779.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)		762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)		33.3 (110.0)	32.2 (108.0)
BLOWER REVOLUTIONS		112908	61504
CVS FLOW STD. CU. METRES(SCF)		208.8 (7375.4)	113.6 (4011.0)
HC SAMPLE METER/RANGE/PPM		23.8/ 2/ 24	28.6/ 2/ 29
HC BCKGRD METER/RANGE/PPM		15.1/ 2/ 15	13.3/ 2/ 13
CO SAMPLE METER/RANGE/PPM		56.8/12/ 126	61.9/11/ 251
CO BCKGRD METER/RANGE/PPM		2.1/12/ 4	.8/11/ 2
CO2 SAMPLE METER/RANGE/PCT		99.9/ 3/ 1.34	92.2/ 3/ 1.72
CO2 BCKGRD METER/RANGE/PCT		3.3/ 3/ .05	3.8/ 3/ .06
NOX SAMPLE METER/RANGE/PPM		7.6/ 2/ 8	4.0/ 2/ 4
NOX BCKGRD METER/RANGE/PPM		1.2/ 2/ 1	1.0/ 2/ 1
HC CONCENTRATION PPM		18	17
CO CONCENTRATION PPM		118	236
CO2 CONCENTRATION PCT		1.32	1.67
NOX CONCENTRATION PPM		6.5	5.1
HC MASS GRAMS		1.23	1.12
CO MASS GRAMS		28.62	31.19
CO2 MASS GRAMS		5099.9	3980.8
NOX MASS GRAMS		2.67	1.18
DFC, WET (DRY)		.897 (.888)	.864 (.860)
SCF, WET (DRY)		1.000 (.977)	1.000 (.973)
VOL (SCM)		208.8	113.6
KM (MEASURED)		21.53	14.92
TEST NUMBER,	PVM-9T	439-32	439-33
BAROMETER,	MM HG	735.8	730.5
HUMIDITY,	G/KG	11.5	12.9
TEMPERATURE,	DEG C	26.7	26.7
TOTAL FUEL SULFUR,	MG/KM	21.69	19.69
AVG. EXH. OXYGEN,	PCT	.34	.10
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	239.3	212.0
FUEL CONSUMPTION,	L/100KM	10.10	9.19
HYDROCARBONS,	G/KM	.06	.07
CARBON MONOXIDE,	G/KM	1.33	1.98
OXIDES OF NITROGEN,	G/KM	.12	.07

TABLE E-34. TEST NO. 436-1 EMISSIONS RESULTS

PVM - 936 FTP VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

TEST NO. 936-11 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

VEHICLE NO. 93
DATE 1/25/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 9122 KM(5668 MILES)

BAROMETER 748.66 MM HG(29.16 IN HG)
RELATIVE HUMIDITY 26 PCT
BAG RESULTS

DRY BULB TEMP. 29.4 DEG C(76.0 DEG F)
ABS. HUMIDITY 5.0 GM/KG

NOX HUMIDITY CORRECTION FACTOR .84

BAG NUMBER / DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	46.1 (115.0)	45.6 (114.0)	44.4 (111.8)	44.4 (111.8)
BLOWER REVOLUTIONS	98728	64683	98629	64648
CVS FLOW STD, CU. METRES(SCF)	76.5 (2701.8)	130.8 (4618.7)	76.3 (2699.2)	130.7 (4615.9)
HC SAMPLE METER/RANGE/PPM	44.8/ 2/ 47	25.7/ 2/ 26	39.3/ 2/ 39	15.6/ 2/ 16
HC BCKGRD METER/RANGE/PPM	25.6/ 2/ 26	25.7/ 2/ 26	22.6/ 2/ 23	23.2/ 2/ 23
CO SAMPLE METER/RANGE/PPM	95.6/11/ 996	33.6/13/ 32	93.1/12/ 199	20.9/13/ 20
CO BCKGRD METER/RANGE/PPM	1.8/11/ 5	4.3/13/ 4	1.6/12/ 3	2.9/13/ 3
CO2 SAMPLE METER/RANGE/PCT	78.0/ 3/ 1.26	91.0/ 3/ .78	63.0/ 3/ 1.12	93.7/ 3/ .75
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.7/ 3/ .04	3.5/ 3/ .05	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	10.8/ 2/ 11	2.4/ 2/ 3	9.0/ 2/ 9	3.9/ 2/ 3
NOX BCKGRD METER/RANGE/PPM	1.0/ 2/ 1	1.2/ 2/ 1	1.0/ 2/ 1	1.1/ 2/ 1
DILUTION FACTOR	10.14	14.84	11.70	17.85
HC CONCENTRATION PPM	99	1	19	-4
CO CONCENTRATION PPM	975	27	186	17
CO2 CONCENTRATION PCT	1.22	.69	1.07	.70
NOX CONCENTRATION PPM	9.9	1.8	8.1	2.9
HC MASS GRAMS	1.93	.10	.60	-.07
CO MASS GRAMS	92.28	4.13	16.98	2.55
CO2 MASS GRAMS	1711.0	1838.9	1500.0	1677.1
NOX MASS GRAMS	1.22	.37	.99	.50
HC GRAMS/KM	.33	.02	.10	-.01
CO GRAMS/KM	7.26	.65	2.80	.40
CO2 GRAMS/KM	293.8	293.8	259.6	269.3
NOX GRAMS/KM	.21	.06	.17	.08
FUEL CONSUMPTION BY CB L/100KM	13.07	10.98	11.07	11.30
RUN TIME SECONDS	505	867	505	868
AVG. EXH. OXYGEN PERCENT	-	-	-	-
CATALYST AVG. TEMP. DEG. C	-	-	568	564
CATALYST MAX. TEMP. DEG. C	-	-	756	667
MEASURED DISTANCE KM	5.82	6.31	5.84	6.35
DFC, WET (DRY)	.931 (.929)		.933 (.931)	
SCF, WET (DRY)	1.000 (.998)		1.000 (.998)	
VOL (SCM)	207.3		207.8	
KM (MEASURED)	18.14		18.29	

COMPOSITE RESULTS

TEST NUMBER	936-11	
BAROMETER	MM HG	748.7
HUMIDITY	G/KG	5.0
TEMPERATURE	DEG C	29.4

TOTAL FUEL SULFUR	MG/KM	23.48
AVG. EXH. OXYGEN	PCT	-
CATALYST AVG. TEMP.	DEG C	-
CATALYST MAX. TEMP.	DEG C	-

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	269.1	(269.1)
FUEL CONSUMPTION	L/100KM	11.16	(11.91)
HYDROCARBONS (THC)	G/KM	.10	(.08)
CARBON MONOXIDE	G/KM	2.61	(2.53)
OXIDES OF NITROGEN	G/KM	.12	(.13)

PVM - 936 3BT VEHICLE EMISSIONS RESULTS - UNMODIFIED
PROJECT 11-9989-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1728 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	936-12	936-13
TEST CYCLE	BET	HFET
RUN NUMBER	1	1
DATE	1/25/79	1/25/79
ODOMETER	9152KM(5687MILES)	9193KM(5712MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	25.0 / 77.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	36.1	35.3
BAROMETER, MM HG(IN HG)	737.9 (29.03)	737.9 (29.03)
RUN TIME, SECONDS	1347	765
BLOWER DIF P MM, H2O(IN, H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, H2O(IN, H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	43.9 (111.0)
BLOWER REVOLUTIONS	112353	61987
CVS FLOW STD, CU. METRES(SCF)	209.9 (7412.5)	114.7 (4052.6)
HC SAMPLE METER/RANGE/PPM	21.4/ 2/ 22	23.8/ 2/ 24
HC BCKGRD METER/RANGE/PPM	22.7/ 2/ 23	14.7/ 2/ 15
CO SAMPLE METER/RANGE/PPM	61.9/12/ 138	98.9/12/ 234
CO BCKGRD METER/RANGE/PPM	1.2/12/ 2	4.8/12/ 4
CO2 SAMPLE METER/RANGE/PCT	75.2/ 3/ 1.37	84.2/ 3/ 1.64
CO2 BCKGRD METER/RANGE/PCT	3.1/ 3/ .05	3.3/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	4.3/ 2/ 4	7.3/ 2/ 7
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.7/ 2/ 1
HC CONCENTRATION PPM	2	11
CO CONCENTRATION PPM	131	218
CO2 CONCENTRATION PCT	1.33	1.62
NOX CONCENTRATION PPM	5.8	6.7
HC MASS GRAMS	.19	.72
CO MASS GRAMS	32.11	29.17
CO2 MASS GRAMS	5189.2	3398.9
NOX MASS GRAMS	2.08	1.38
DFC, WET (DRY)	.893 (.892)	.879 (.878)
SCF, WET (DRY)	1.000 (.998)	1.000 (.998)
VOL (SCM)	209.9	114.7
KM (MEASURED)	21.98	16.76
TEST NUMBER, PVM-BT	936-12	936-13
BAROMETER, MM HG	737.9	737.9
HUMIDITY, G/KG	7.3	6.9
TEMPERATURE, DEG C	25.0	24.4
TOTAL FUEL SULFUR, MG/KM	21.96	18.81
AVG. EXH. OXYGEN, PCT	.08	.01
CATALYST AVG. TEMP., DEG C	-	-
CATALYST MAX. TEMP., DEG C	-	-
CARBON DIOXIDE, G/KM	238.3	202.7
FUEL CONSUMPTION, L/100KM	10.01	8.77
HYDROCARBONS, G/KM	.01	.04
CARBON MONOXIDE, G/KM	1.46	1.74
OXIDES OF NITROGEN, G/KM	.09	.08

TABLE E-35. TEST NO. 436-2 EMISSIONS RESULTS

PVH - 936 FTP VEHICLE EMISSIONS RESULTS - DISABLED O2 + R.B.I.
PROJECT 11-9989-001

TEST NO. 936-81 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1928 KG(3810 LBS)

VEHICLE NO. 93
DATE 1/31/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399
ODOMETER 9811 KM(6910 MILES)

BAROMETER 751.08 MM HG(29.57 IN HG)
RELATIVE HUMIDITY 16 PCT
DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
ABS. HUMIDITY 2.5 GM/KG
NOX HUMIDITY CORRECTION FACTOR .74

BAG RESULTS

BAG NUMBER	1	2	3	4
DESCRIPTION	COLD TRANSIENT	STABILIZED	HOT TRANSIENT	STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	46.1 (115.0)	44.9 (112.0)	42.8 (109.0)	41.7 (107.0)
BLOWER REVOLUTIONS	48539	49705	49672	49669
CVS FLOW STD. CU. METRES(SCF)	77.5 (2737.5)	132.6 (4683.0)	77.6 (2741.2)	133.2 (4703.8)
HC SAMPLE METER/RANGE/PPM	12.6/ 3/ 126	79.0/ 2/ 79	10.6/ 3/ 106	81.9/ 2/ 81
HC BCKGRD METER/RANGE/PPM	.6/ 3/ 6	6.3/ 2/ 6	.7/ 3/ 7	7.9/ 2/ 7
CO SAMPLE METER/RANGE/PPM	78.0/ 3/ 1822	59.7/ 3/ 1356	72.6/ 3/ 1687	60.5/ 3/ 1526
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	.9/ 3/ 9	.9/ 3/ 9	.5/ 3/ 11
CO2 SAMPLE METER/RANGE/PCT	69.8/ 3/ 1.16	39.5/ 3/ .58	53.2/ 3/ .93	36.0/ 3/ .60
CO2 BCKGRD METER/RANGE/PCT	3.7/ 3/ .06	3.8/ 3/ .05	3.9/ 3/ .05	3.2/ 3/ .05
NOX SAMPLE METER/RANGE/PPM	10.7/ 2/ 11	3.3/ 2/ 3	9.2/ 2/ 9	3.6/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.8/ 2/ 0	.3/ 2/ 0	.3/ 2/ 0	.9/ 2/ 0
DILUTION FACTOR	9.99	18.68	11.98	17.59
HC CONCENTRATION PPM	121	68	100	79
CO CONCENTRATION PPM	1770	1323	1952	1908
CO2 CONCENTRATION PCT	1.11	.53	.88	.56
NOX CONCENTRATION PPM	10.5	3.0	8.4	3.2
HC MASS GRAMS	5.39	5.20	9.96	5.72
CO MASS GRAMS	159.71	204.36	147.98	230.69
CO2 MASS GRAMS	1572.4	1297.8	1852.8	1360.3
NOX MASS GRAMS	1.23	.69	1.09	.68
HC GRAMS/KM	.92	.93	.75	.91
CO GRAMS/KM	27.30	32.69	28.29	36.83
CO2 GRAMS/KM	268.8	206.9	211.3	217.2
NOX GRAMS/KM	.21	.10	.18	.10
FUEL CONSUMPTION BY CB L/100KM	13.93	11.10	11.09	11.86
RUN TIME SECONDS	505	867	505	868
AVG. EXH. OXYGEN PERCENT	-	.90	.90	.51
CATALYST AVG. TEMP. DEG. C	-	505	511	488
CATALYST MAX. TEMP. DEG. C	757	559	579	592
MEASURED DISTANCE KM	5.85	6.25	5.93	6.26
DFC, WET (DRY)	.929 (.924)		.933 (.933)	
SCF, WET (DRY)	1.000 (.995)		1.000 (.993)	
VOL (SCM)	210.1		210.8	
KM (MEASURED)	12.10		12.19	

COMPOSITE RESULTS

					3-BAG	(4-BAG)
TEST NUMBER	936-81	TOTAL FUEL SULFUR MG/KM	29.97	CARBON DIOXIDE G/KM	220.5	(223.8)
BAROMETER MM HG	751.1	AVG. EXH. OXYGEN PCT	-	FUEL CONSUMPTION L/100KM	11.54	(11.78)
HUMIDITY G/KG	2.5	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM	.83	(.85)
TEMPERATURE DEG C	21.1	CATALYST MAX. TEMP. DEG C	-	CARBON MONOXIDE G/KM	30.33	(31.55)
				OXIDES OF NITROGEN G/KM	.19	(.19)

PVH - 936 3B7 VEHICLE EMISSIONS RESULTS - DISABLED O2 + R.B.I.
PROJECT 11-9989-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1928 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.3 HP)
GASOLINE EM-399

TEST NUMBER	936-82	936-83
TEST CYCLE	9BT	HFET
RUN NUMBER	1	1
DATE	1/31/79	1/31/79 / /
ODOMETER	9592KM(5929MILES)	9682KM(6969MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.3 / 73.8	23.9 / 75.0
RELATIVE HUMIDITY, PCT	17.6	10.1
BAROMETER, MM HG(IN HG)	751.6 (29.59)	750.8 (29.56)
RUN TIME, SECONDS	1401	766
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	736.6 (29.0)	736.6 (29.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.2 (108.0)	43.3 (110.0)
BLOWER REVOLUTIONS	113983	62358
CVS FLOW STD. CU. METRES(SCF)	218.0 (7698.7)	118.9 (4198.9)
HC SAMPLE METER/RANGE/PPM	12.7/ 3/ 127	15.0/ 3/ 150
HC BCKGRD METER/RANGE/PPM	1.0/ 3/ 10	1.3/ 3/ 13
CO SAMPLE METER/RANGE/PPM	99.3/ 3/ 2783	69.1/ 2/ 3391
CO BCKGRD METER/RANGE/PPM	.9/ 3/ 9	.3/ 2/ 11
CO2 SAMPLE METER/RANGE/PCT	69.6/ 3/ 1.15	77.5/ 3/ 1.98
CO2 BCKGRD METER/RANGE/PCT	3.9/ 3/ .09	3.6/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	11.7/ 2/ 12	13.9/ 2/ 14
NOX BCKGRD METER/RANGE/PPM	.2/ 2/ 0	.9/ 2/ 0
HC CONCENTRATION PPM	118	134
CO CONCENTRATION PPM	2628	3230
CO2 CONCENTRATION PCT	1.12	1.37
NOX CONCENTRATION PPM	11.5	13.6
HC MASS GRAMS	19.89	9.51
CO MASS GRAMS	469.47	497.89
CO2 MASS GRAMS	9952.0	5982.8
NOX MASS GRAMS	3.66	2.34
DFC, WET (DRY)	.893 (.893)	.864 (.864)
SCF, WET (DRY)	1.000 (.984)	1.000 (.987)
VOL (SCM)	210.8	118.9
KM (MEASURED)	22.15	10.85

TEST NUMBER,	PVH-87	936-82	936-83
BAROMETER,	MM HG	751.6	750.8
HUMIDITY,	G/KG	3.1	1.9
TEMPERATURE,	DEG C	23.3	23.9
TOTAL FUEL SULFUR,	MG/KM	22.48	28.17
AVG. EXH. OXYGEN,	PCT	.31	.85
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	281.8	177.0
FUEL CONSUMPTION,	L/100KM	10.68	9.41
HYDROCARBONS,	G/KM	.67	.56
CARBON MONOXIDE,	G/KM	38.02	29.53
OXIDES OF NITROGEN,	G/KM	.17	.19

TABLE E-36. TEST NO. 436-3 EMISSIONS RESULTS

PVH - 936 FTP VEHICLE EMISSIONS RESULTS - DISABLED O2 + R.B.I.
PROJECT 11-9999-001

TEST NO. 936-91 RUN 1
VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4
TRANSMISSION A3
GVW 1729 KG(3810 LBS)

VEHICLE NO. 93
DATE 2/ 1/79
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399
ODOMETER 9601 KM(5966 MILES)

BAROMETER 999.76 MM HG(29.99 IN HG)
RELATIVE HUMIDITY 18 PCT
BAG RESULTS

DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
ABS. HUMIDITY 3.2 GM/KG

NOX HUMIDITY CORRECTION FACTOR .80

	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BAG NUMBER				
DESCRIPTION				
BLOWER DIF P MM, MPO(IN, H20)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, MPO(IN, H20)	744.3 (29.5)	744.3 (29.5)	744.3 (29.5)	744.3 (29.5)
BLOWER INLET TEMP, DEG. C(DEG. F)	43.3 (110.0)	42.8 (109.0)	43.3 (110.0)	42.2 (108.0)
BLOWER REVOLUTIONS	90744	90859	90873	64796
CVS FLOW STD. CU. METRES(SCF)	77.2 (2726.4)	138.8 (4901.7)	77.9 (2735.5)	138.5 (4879.0)
HC SAMPLE METER/RANGE/PPM	13.1/ 3/ 131	72.6/ 2/ 73	10.7/ 3/ 107	79.5/ 2/ 79
HC BCKGRD METER/RANGE/PPM	.9/ 3/ 9	9.0/ 2/ 9	.9/ 3/ 9	11.5/ 2/ 11
CO SAMPLE METER/RANGE/PPM	69.1/ 3/ 1729	51.3/ 3/ 1284	71.5/ 3/ 1871	56.0/ 3/ 1916
CO BCKGRD METER/RANGE/PPM	.1/ 3/ 2	.2/ 3/ 5	.3/ 3/ 7	.2/ 3/ 5
CO2 SAMPLE METER/RANGE/PCT	60.1/ 3/ 1.04	34.9/ 3/ .58	53.7/ 3/ .94	35.2/ 3/ .59
CO2 BCKGRD METER/RANGE/PCT	3.5/ 3/ .05	3.9/ 3/ .06	3.9/ 3/ .06	3.9/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	9.9/ 2/ 9	3.9/ 2/ 3	9.0/ 2/ 9	9.1/ 2/ 9
NOX BCKGRD METER/RANGE/PPM	.6/ 2/ 1	.6/ 2/ 1	.6/ 2/ 1	.6/ 2/ 1
DILUTION FACTOR	10.75	10.74	11.84	10.20
HC CONCENTRATION PPM	123	64	99	64
CO CONCENTRATION PPM	1681	1233	1819	1387
CO2 CONCENTRATION PCT	1.08	.53	.88	.53
NOX CONCENTRATION PPM	8.9	2.8	8.5	3.5
HC MASS GRAMS	5.93	9.91	9.91	5.29
CO MASS GRAMS	151.19	190.69	169.01	213.95
CO2 MASS GRAMS	1936.6	1888.6	1883.9	1248.7
NOX MASS GRAMS	1.05	.88	1.00	.72
HC GRAMS/KM	.93	.77	.95	.89
CO GRAMS/KM	25.82	30.10	27.88	34.27
CO2 GRAMS/KM	296.5	202.5	313.2	207.0
NOX GRAMS/KM	.18	.09	.17	.11
FUEL CONSUMPTION AV CB L/100KM	12.33	10.76	11.07	11.25
RUN TIME SECONDS	506	972	505	868
AVG. EXH. OXYGEN PERCENT	.88	1.22	.87	1.23
CATALYST AVG. TEMP. DEG. C	503	504	521	488
CATALYST MAX. TEMP. DEG. C	730	572	579	546
MEASURED DISTANCE KM	5.85	5.39	5.88	5.29
DFC, WET (DRY)	.938 (.932)		.939 (.933)	
SCF, WET (DRY)	1.000 (.993)		1.000 (.993)	
VOL (SCM)	210.0		209.9	
KM (MEASURED)	18.14		12.13	

COMPOSITE RESULTS

						3-BAG	(9-BAG)
TEST NUMBER	936-91	TOTAL FUEL SULFUR MG/KM	23.99	CARBON DIOXIDE G/KM		219.3	(215.6)
BAROMETER MM HG	999.8	AVG. EXH. OXYGEN PCT	1.08	FUEL CONSUMPTION L/100KM		11.17	(11.32)
HUMIDITY G/KG	3.2	CATALYST AVG. TEMP. DEG C	-	HYDROCARBONS (THC) G/KM		.80	(.82)
TEMPERATURE DEG C	23.3	CATALYST MAX. TEMP. DEG C	-	CARBON MONOXIDE G/KM		28.61	(29.83)
				OXIDES OF NITROGEN G/KM		.13	(.19)

PVH - 936 387 VEHICLE EMISSIONS RESULTS - DISABLED O2 + R.B.I.
PROJECT 11-9999-001

VEHICLE MODEL 78 SAAB 99
ENGINE 2.0 L(121 CID) L-4

VEHICLE NO. 93
TRANSMISSION A3
GVW 1729 KG(3810 LBS)

TEST WEIGHT 1361 KG(3000 LBS)
ACTUAL ROAD LOAD 8.9 KW(11.9 HP)
GASOLINE EM-399

TEST NUMBER	936-32	936-33
TEST CYCLE	SET	HFET
RUN NUMBER	1	1
DATE	2/ 1/79	2/ 1/79 / /
ODOMETER	9539KM(5928MILES)	9672KM(6010MILES)
CVS - BAG CART - DYNAMOMETER	2 - 1 - 3	2 - 1 - 3
TEMPERATURE DEG. C (DEG. F)	23.9 / 75.0	24.4 / 76.0
RELATIVE HUMIDITY, PCT	21.7	28.8
BAROMETER, MM HG(IN HG)	747.5 (29.43)	747.5 (29.43)
RUN TIME, SECONDS	1348	766
BLOWER DIF P MM, MPO(IN, H20)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM, MPO(IN, H20)	744.3 (29.5)	744.3 (29.5)
BLOWER INLET TEMP, DEG. C(DEG. F)	42.8 (109.0)	43.3 (110.0)
BLOWER REVOLUTIONS	113932	63059
CVS FLOW STD. CU. METRES(SCF)	215.7 (7618.3)	118.6 (4189.8)
HC SAMPLE METER/RANGE/PPM	12.6/ 3/ 126	15.1/ 3/ 151
HC BCKGRD METER/RANGE/PPM	1.1/ 3/ 11	2.8/ 3/ 28
CO SAMPLE METER/RANGE/PPM	91.8/ 3/ 2574	61.3/ 2/ 3191
CO BCKGRD METER/RANGE/PPM	.3/ 3/ 7	.3/ 2/ 11
CO2 SAMPLE METER/RANGE/PCT	49.6/ 3/ 1.13	79.2/ 3/ 1.35
CO2 BCKGRD METER/RANGE/PCT	3.6/ 3/ .06	3.7/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	11.9/ 2/ 11	10.3/ 2/ 19
NOX BCKGRD METER/RANGE/PPM	.9/ 2/ 1	1.3/ 2/ 1
HC CONCENTRATION PPM	116	126
CO CONCENTRATION PPM	2944	3020
CO2 CONCENTRATION PCT	1.09	1.30
NOX CONCENTRATION PPM	11.0	13.2
HC MASS GRAMS	19.95	9.65
CO MASS GRAMS	627.56	417.17
CO2 MASS GRAMS	9287.9	7825.0
NOX MASS GRAMS	3.71	2.59
DFC, WET (DRY)	.896 (.890)	.876 (.872)
SCF, WET (DRY)	1.000 (.994)	1.000 (.995)
VOL (SCM)	215.7	118.6
KM (MEASURED)	22.00	19.67
TEST NUMBER,	PVH-87	
BAROMETER,	MM HG	936-32	936-33
HUMIDITY,	G/KG	747.5	747.5
TEMPERATURE,	DEG C	9.0	9.5
TOTAL FUEL SULFUR,	MG/KM	23.9	24.4
		22.11	19.25
AVG. EXH. OXYGEN,	PCT	.69	.16
CATALYST AVG. TEMP.,	DEG C	-	-
CATALYST MAX. TEMP.,	DEG C	-	-
CARBON DIOXIDE,	G/KM	199.9	169.5
FUEL CONSUMPTION,	L/100KM	10.32	8.98
HYDROCARBONS,	G/KM	.66	.52
CARBON MONOXIDE,	G/KM	28.52	25.03
OXIDES OF NITROGEN,	G/KM	.17	.15

APPENDIX F

SHORT-TEST PROCEDURES RESULTS

TABLE F-1. CAR 41 - SHORT TEST PROCEDURES RESULTS
1978 Ford Pinto - Three-Way Plus Oxidation Catalysts

41- UNMODIFIED		Transient Cycle Tests FTP	NYCC	FSC		Steady State Raw Emissions Tests TSIT 2500	TSIT IDLE	FTM 52 MPH	FTM 25 MPH	FTM IDLE
Barometer,	mm Hg	748.8	748.8	748.8						
Humidity,	g/kg	3.4	3.2	4.5						
Temperature,	°C	22.8	25.3	25.0						
Carbon Dioxide,	g/km	258.4	466.5	213.3						
Fuel Cons.,	ℓ/100km	11.1	19.9	9.1						
Hydrocarbons,	g/km	0.07	0.03	0.02	ppmH*[a]	45	43	47	45	47
Carbon Monoxide,	g/km	1.44	0.08	0.02	% [a]	<0.01	<0.01	<0.01	<0.01	<0.01
Oxides of Nitrogen,	g/km	0.49	0.44	0.26	ppm NO [a]	33	21	585	135	28
411-3 - DISABLED 02		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	749.0	745.7	745.7						
Humidity,	g/kg	9.5	6.9	6.6						
Temperature,	°C	26.7	25.6	23.3						
Carbon Dioxide,	g/km	284.3	462.1	224.3						
Fuel Cons.,	ℓ/100km	12.3	19.9	9.7						
Hydrocarbons,	g/km	0.09	0.14	0.10	ppmH*[b]	55	44	55	57	52
Carbon Monoxide,	g/km	2.28	2.03	1.07	%	<0.01	<0.01	0.21[b]	0.11[b]	0.01
Oxides of Nitrogen,	g/km	0.33	0.31	0.25	ppm NO	26[b]	27	220	25[b]	27
412-2 - 12 PCT. MISFIRE		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	751.3	753.9	753.9						
Humidity,	g/kg	8.5	7.9	8.6						
Temperature,	°C	21.7	26.1	24.4						
Carbon Dioxide,	g/km	262.5	471.0	229.1						
Fuel Cons.,	ℓ/100km	11.4	20.2	9.8						
Hydrocarbons,	g/km	0.40	0.03	0.08	ppmH*	42	40	40	40	39
Carbon Monoxide,	g/km	2.60	0.89	0.54	%	<0.01	<0.01	<0.01	0.01	0.01
Oxides of Nitrogen,	g/km	0.31	0.35	0.15	ppm NO	9	1[c]	180	40	44[c]

TABLE F-1(Cont'd). CAR 41 - SHORT TEST PROCEDURES RESULTS
1978 Ford Pinto - Three-Way Plus Oxidation Catalysts

413-2 DISABLED EGR & O_2		Transient Cycle Tests FTP	NYCC	FSC		Steady State Emissions Tests TSIT 2500	TSIT IDLE	FTM 52 MPH	FTM 25 MPH	FTM IDLE
Barometer,	mm Hg	749.0	748.0	748.0						
Humidity,	g/kg	2.4	3.0	4.4						
Temperature,	°C	23.9	25.0	24.4						
Carbon Dioxide,	g/km	275.1	466.2	223.7						
Fuel Cons.,	ℓ/100km	11.9	20.4	10.0						
Hydrocarbons,	g/km	0.12	0.39	0.26	ppmH*	45	42	45	44	45
Carbon Monoxide,	g/km	1.96	6.91	5.66	%	<0.01	<0.01	0.43	0.06	<0.01
Oxides of Nitrogen,	g/km	0.73	0.52	0.50	ppm NO	90	18	320	290	19

415-3 DISABLED AIR & O_2		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	739.1	742.7	742.7						
Humidity,	g/kg	10.1	8.1	7.2						
Temperature,	°C	23.3	26.1	25.0						
Carbon Dioxide,	g/km	212.8	388.3	175.2						
Fuel Cons.,	ℓ/100km	11.5	18.5	8.9						
Hydrocarbons,	g/km	1.04	0.85	0.72	ppmH*	151	49	192	214	52
Carbon Monoxide,	g/km	33.23	26.22	20.10	%	1.77	<0.01	4.01	2.84	0.01
Oxides of Nitrogen,	g/km	0.08	0.08	0.04	ppm NO	13	39	100	58	40

*ppmH - Hydrocarbons as ppm Hexane measured using an Infrared Emission Analyzer

FTP - Light Duty Federal Test Procedure
NYCC - New York City Cycle
FSC - Federal Short Cycle

TSIT - Two Speed Idle Test
FTM - Federal Three Mode

[a] Average of two evaluations.
[b] Significant difference between results in initial test and test reported.
[c] Values during idle varied from 1 to 44 ppm in a number of repeat evaluations.

TABLE F-2. CAR 42 - SHORT TEST PROCEDURES RESULTS
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

42- UNMODIFIED		Transient Cycle Tests FTP	NYCC	FSC		Steady State Raw Emissions Tests TSIT 2500	TSIT IDLE	FTM 52 MPH	FTM 25 MPH	FTM IDLE
Barometer,	mm Hg	743.5	743.7	743.7						
Humidity,	g/kg	10.2	8.1	8.1						
Temperature,	°C	22.8	24.4	24.4						
Carbon Dioxide,	g/km	253.0	433.8	223.5						
Fuel Cons.,	ℓ/100km	11.0	18.6	9.6						
Hydrocarbons,	g/km	0.18	0.02	0.03	ppmH*	43	41	42	40	43
Carbon Monoxide,	g/km	2.80	1.41	0.24	%	<0.01	<0.01	<0.01	<0.01	<0.01
Oxides of Nitrogen,	g/km	0.41	0.72	0.30	ppm NO	165	34	560	950	35
421-2 - DISABLED 02		**FTP**	**NYCC**	**FSC**		**2500**	**IDLE**	**52 MPH**	**25 MPH**	**IDLE**
Barometer,	mm Hg	743.7	742.7	742.7						
Humidity,	g/kg	7.3	7.7	7.1						
Temperature,	°C	23.3	23.9	23.9						
Carbon Dioxide,	g/km	202.1	347.9	174.2						
Fuel Cons.,	ℓ/100km	12.6	20.7	9.8						
Hydrocarbons,	g/km	1.45	2.37	1.12	ppmH*	132	175	163	171	163
Carbon Monoxide,	g/km	55.59	81.97	33.45	%	2.42	4.37	4.76	2.93	4.58
Oxides of Nitrogen,	g/km	0.13	0.07	0.06	ppm NO	19	5	41	28	13
422-3 - 12 PCT. MISFIRE		**FTP[a]**	**NYCC**	**FSC**		**2500**	**IDLE**	**52 MPH**	**25 MPH**	**IDLE**
Barometer,	mm Hg	739.8	738.1	738.1						
Humidity,	g/kg	11.9	10.2	11.2						
Temperature,	°C	24.7	26.1	25.6						
Carbon Dioxide,	g/km	245.4	489.2	237.1						
Fuel Cons.,	ℓ/100km	10.9	21.1	10.2						
Hydrocarbons,	g/km	1.05	0.26	0.13	ppmH*	151	56	218	129	61
Carbon Monoxide,	g/km	4.71	2.71	0.94	%	0.31	0.01	0.47	0.37	0.13
Oxides of Nitrogen,	g/km	0.37	1.18	0.32	ppm NO	7	5	46	25	2

[a] average of two runs

TABLE F-2 (Cont'd). CAR 42 - SHORT TEST PROCEDURES RESULTS
1978 PONTIAC SUNBIRD - THREE-WAY CATALYST

423-2 Disabled EGR & O_2		Transient Cycle Tests FTP	NYCC	FSC		Steady State Emissions Tests TSIT 2500	TSIT IDLE	FTM 52 MPH	FTM 25 MPH	FTM IDLE
Barometer,	mm Hg	736.9	735.6	735.6						
Humidity,	g/kg	13.0	11.8	10.8						
Temperature,	°C	26.7	27.8	26.7						
Carbon Dioxide,	g/km	191.9	291.1	137.8						
Fuel Cons.,	ℓ/100km	12.2	19.4	8.9						
Hydrocarbons,	g/km	1.37	2.22	1.09	ppmH*	154	222	173	183	203
Carbon Monoxide,	g/km	56.99	99.36	42.56	%	3.44	6.57	5.20	4.17	6.65
Oxides of Nitrogen,	g/km	0.14	0.09	0.07	ppm NO	20	5	55	23	3

424-2 High Oil Consumption		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	743.2	738.1	738.1						
Humidity,	g/kg	11.8	9.1	9.1						
Temperature,	°C	23.9	25.6	25.6						
Carbon Dioxide,	g/km	263.4	425.1	217.7						
Fuel Cons.,	ℓ/100km	11.5	18.4	9.4						
Hydrocarbons,	g/km	0.23	0.16	0.09	ppmH*	57	52	53	49	49
Carbon Monoxide,	g/km	2.95	2.87	0.79	%	0.01	<0.01	0.01	<0.01	<0.01
Oxides of Nitrogen,	g/km	0.57	0.56	0.31	ppm NO	160	59	500	910	66

*ppmH - Hydrocarbons as ppm Hexane measured using an Infrated Emission Analyzer

FTP - Light Duty Federal Test Procedure
NYCC - New York City Cycle
FSC - Federal Short Cycle
TSIT - Two Speed Idle Test
FTM - Federal Three Mode

TABLE F-3. CAR 43 - SHORT TEST PROCEDURES RESULTS
1978 SAAB 99 - THREE-WAY CATALYST

43-

UNMODIFIED		Transient Cycle Tests FTP	NYCC	FSC		Steady State Raw Emissions Tests TSIT 2500	IDLE	FTM 52 MPH	25 MPH	IDLE
Barometer,	mm Hg	748.4	747.0	747.0						
Humidity,	g/kg	5.7	5.1	5.1						
Temperature,	°C	22.3	23.6	23.6						
Carbon Dioxide,	g/km	248.0	445.5	230.6						
Fuel Cons.,	ℓ/100km	10.7	19.1	9.9						
Hydrocarbons,	g/km	0.12	0.05	0.02	ppmH*	49	49	56	48	49
Carbon Monoxide,	g/km	1.76	0.39	0.22	%	0.09	0.01	0.15	0.01	0.01
Ocides of Notrogen,	g/km	0.10	0.16	0.13	ppm NO	15	24	73	16	25
431-3 - DISABLED O_2		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	746.3	745.5	745.5						
Humidity,	g/kg	8.1	9.9	8.5						
Temperature,	°C	24.4	25.0	25.0						
Carbon Dioxide,	g/km	246.3	427.4	219.9						
Fuel Cons.,	ℓ/100km	11.8	19.8	10.4						
Hydrocarbons,	g/km	0.68	0.85	0.54	ppmH*	80	87	122	125	89
Carbon Monoxide,	g/km	18.14	21.87	13.97	%	1.85	1.30	1.43	1.11	2.34
Oxides of Nitrogen,	g/km	0.19	0.14	0.12	ppm NO	9	10	130	53	41
432-2 12 PCT. MISFIRE		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	758.7	754.9	754.9						
Humidity,	g/kg	2.5	2.3	1.8						
Temperature,	°C	22.2	23.9	23.9						
Carbon Dioxide,	g/km	276.6	443.6	234.1						
Fuel Cons.,	ℓ/100km	12.8	20.1	10.7						
Hydrocarbons,	g/km	2.21	3.29	1.89	ppmH*	500	467	387	477	453
Carbon Monoxide,	g/km	10.82	10.69	6.57	%	0.63	0.31	1.02	0.67	0.31
Oxides of Nitrogen,	g/km	0.09	0.07	0.06	ppm NO	8	3	56	20	3

TABLE F-3 (Cont'd). - SHORT TEST PROCEDURES RESULTS
1978 SAAB 99 - THREE-WAY CATALYST

436-2 DISABLED O_2 + R.B.I.		Transient Cycle Tests FTP	NYCC	FSC		Steady State Emissions Tests TSIT 2500	TSIT IDLE	FTM 52 MPH	FTM 25 MPH	FTM IDLE
Barometer,	mm Hg	751.1	750.8	750.8						
Humidity,	g/kg	2.5	3.5	3.7						
Temperature,	°C	21.1	23.9	23.3						
Carbon Dioxide,	g/km	220.5	366.0	189.4						
Fuel Cons.,	ℓ/100km	11.6	20.2	10.1						
Hydrocarbons,	g/km	0.83	1.58	0.73	ppmH*	108	141	143	178	143
Carbon Monoxide,	g/km	30.33	64.52	28.66	%	3.44	4.12	3.25	3.44	4.17
Oxides of Nitrogen,	g/km	0.14	0.22	0.14	ppm NO	7	4	75	15	3

434-2 HIGH OIL CONSUMPTION		FTP	NYCC	FSC		2500	IDLE	52 MPH	25 MPH	IDLE
Barometer,	mm Hg	733.3	730.5	730.5						
Humidity,	g/kg	12.0	10.6	10.2						
Temperature,	°C	25.6	27.2	30.0						
Carbon Dioxide,	g/km	269.7	434.5	230.1						
Fuel Cons.,	ℓ/100km	11.7	18.7	9.9						
Hydrocarbons,	g/km	0.12	0.09	0.09	ppmH*	50	49	63	57	53
Carbon Monoxide,	g/km	2.08	1.45	1.10	%	0.07	<0.01	0.22	0.04	<0.01
Oxides of Nitrogen,	g/km	0.13	0.18	0.07	ppm NO	3	22	64	13	15

*ppmH - Hydrocarbons as ppm Hexane measured using an Infrared Emission Analyzer

FTP - Light Duty Federal Test Procedure
NYCC - New York City Cycle
FSC - Federal Short Cycle
TSIT - Two Speed Idle Test
FTM - Federal Three Mode

APPENDIX G

AVERAGE VALUES FOR UNMODIFIED CONFIGURATION

TABLE G-1. AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 41
1978 Ford Pinto with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST	41X-11			41X-12			41X-13		
Barometer, mm Hg	744.9	738.6	752.9	746.3	743.2	753.1	746.2	743.2	752.6
Humidity, g/kg	7.1	2.9	11.4	5.8	3.4	9.2	6.8	3.2	10.6
Temperature, °C	23.8	21.7	26.7	24.4	22.8	27.2	25.3	23.9	28.3
Total Fuel Sulfur, mg/km	23.8	23.8	24.0	18.5	18.2	19.3	16.9	16.2	17.6
Avg. Exh. Oxygen, %	6.3	5.9	6.8	6.0	5.7	6.4	5.3	4.8	5.9
Catalyst Avg. Temp., °C	417.	397.	430.	480.	463.	496.	515.	500.	532.
Catalyst Max. Temp., °C	560.	499.	678.	546.	529.	559.	555.	542.	567.
Carbon Dioxide, g/km	258.3	257.8	258.8	202.5	199.3	210.4	184.3	176.9	191.9
Fuel Cons., ℓ/100 km	11.12	11.09	11.18	8.65	8.51	8.98	7.87	7.55	8.20
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.07	0.06	0.08	0.01	0.01	0.02	0.01	0.01	0.01
Carbon Monoxide, g/km	1.30	0.91	1.84	0.03	0.01	0.04	0.03	0.01	0.05
Oxides of Nitrogen, g/km	0.47	0.44	0.49	0.69	0.57	0.80	0.75	0.62	0.94
Particulates									
Total Particulates	15.28	8.19	30.03	4.85	1.85	6.93	13.82	6.36	22.67
Sulfate	3.13	1.79	4.61	2.19	1.05	4.34	7.05	3.49	9.03
Sulfate as % of TFS, %									
Compound Group Totals									
Aldehydes & Ketones	1.1	0.0	3.9	2.4	0.0	4.2	3.0	0.9	4.4
Individual Hydrocarbons	40.6	33.6	52.9	11.2	8.9	13.8	5.8	4.6	7.7
Organic Sulfides	0.78	0.62	1.02	0.30	0.01	0.84	0.14	0.00	0.27
Organic Amines	0.03	0.00	0.11	0.01	0.00	0.04	0.00	0.00	0.01
Other Compounds									
Ammonia	6.0	3.7	9.3	--	--	--	--	--	--
Cyanide & Cyanogen	0.05	0.00	0.14	--	--	--	--	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	16.0	12.5	18.9	9.4	8.0	11.0	6.1	4.6	8.1

TABLE G-1 (Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 41
1978 Ford Pinto with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVMFST	41X-11			41X-12			41X-13		
Aldehydes and Ketones									
Formaldehyde	0.79	0.00	3.14	2.10	0.03	4.16	2.64	0.13	4.31
Acetaldehyde	0.00	0.00	0.00	0.07	0 00	0.28	0.00	0.00	0.00
Acetone	0.04	0.00	0.14	0.02	0.00	0.07	0.03	0.00	0.12
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.51
Methyl Ethyl Ketone	0.14	0.00	0.26	0.02	0.00	0.07	0.11	0.00	0.24
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.09	0.00	0.34	0.17	0.00	0.68	0.04	0.00	0.17
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	1.1	0.0	3.9	2.4	0.0	4.2	3.0	0.9	4.4
Total as % of THC, %	1.6	0.0	5.6	10.9	0.0	21.0	29.8	9.0	44.0
Individual Hydrocarbons									
Methane	29.46	21.64	37.45	10.46	8.59	12.66	5.55	4.29	7.64
Ethylene	2.92	2.04	3.85	0.01	0.00	0.02	0.03	0.00	0.10
Ethane	1.99	1.54	2.73	0.69	0.25	1.10	0.20	0.09	0.31
Acetylene	1.64	0.40	2.35	0.00	0.00	0.00	0.00	0.00	0.00
Propane	0.07	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.01
Propylene	0.91	0.65	1.09	0.00	0.00	0.01	0.02	0.00	0.05
Benzene	1.91	1.04	2.93	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	1.73	0.09	3.45	0.04	0.00	0.11	0.00	0.00	0.08
Total Individual HC	40.6	33.6	52.9	11.2	8.9	13.8	5.8	4.6	7.7
Total as % of THC, %	60.4	56.0	66.1	89.3	69.0	110.0	58.1	46.4	77.0
Organic Sulfides									
Carbonyl Sulfide	0.68	0.56	0.77	0.29	0.01	0.84	0.08	0.00	0.14
Methyl Sulfide	0.10	0.00	0.25	0.02	0.00	0.04	0.06	0.00	0.14
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.03	0.01	0.00	0.04	0.00	0.00	0.01
Monoethylamine	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00

TABLE G-1 (Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 41
1978 Ford Pinto with Three-Way Catalyst

		EMISSION RATE, MG/KM (Except at Noted)								
		FTP			SET			HFET		
		Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST		41X-11			41X-12			41X-13		
Trace Elements										
Chromium	Cr									
Lead	Pb	0.14		0.26	0.07		0.18	0.06		0.13
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.02		0.06	0.02		0.05			
Phosphorus	P	0.01	0.01	0.01	0.01		0.01	0.01		0.01
Silicon	Si	0.01		0.02	0.01		0.01			
Cadmium	Cd									
Aluminum	Al	0.04	0.02	0.05	0.02	0.01	0.03	0.01		0.01
Sulfur	S	2.81	1.04	6.84	1.07	0.45	1.84	3.93	1.71	5.66
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0.01	0.01	0.01	0.01	0.01	0.01			
Potassium	K									
Chlorine	Cl	0.01		0.03	0.03		0.12	0.01		0.02
Platinum	Pt									
Zinc	Zn	0.01		0.02	0.02	0.01	0.02	0.00		0.01
Copper	Cu	0.01		0.03	0.01		0.02			
Nickel	Ni	0.01		0.04						
Iron	Fe	0.80	0.24	1.68	0.17	0.08	0.32	0.07	0.04	0.12
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.02
Calcium	Ca	0.02	0.01	0.02	0.01	0.01	0.01	0.01		0.01

TABLE G-2. AVERAGE, MINIMUM AND MAXIMUM VALUES FOR
THE UNMODIFIED CONFIGURATION - CAR 42
1978 Pontiac Sunbird with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST	42X-11			42X-21			42X-31		
Barometer, mm Hg	748.7	743.5	754.6	749.4	743.7	755.4	749.1	743.7	754.4
Humidity, g/kg	6.5	2.3	10.8	8.6	3.1	18.3	8.1	2.9	18.3
Temperature, °C	23.8	22.8	26.1	24.9	23.3	27.8	25.0	23.9	27.8
Total Fuel Sulfur, mg/km	23.3	22.9	23.8	18.3	17.3	19.0	15.7	14.4	16.6
Avg. Exh. Oxygen, %	1.5	1.2	1.9	1.2	1.0	1.6	0.4	0.4	0.5
Catalyst Avg. Temp., °C	407.	375.	432.	532.	506.	551.	596.	571.	611.
Catalyst Max. Temp., °C	502.	492.	517.	617.	601.	644.	627.	610.	636.
Carbon Dioxide, g/km	250.6	245.0	255 4	199.0	189.0	207.0	171.1	157.4	181.6
Fuel Cons., ℓ/100 km	10.89	10.68	11.08	8.53	8.08	8.87	7.32	6.73	7.76
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.16	0.14	0.18	0.02	0.01	0.02	0.03	0.01	0.07
Carbon Monoxide, g/km	2.60	2.09	3.07	0.56	0.20	0.86	0.21	0.07	0.37
Oxides of Nitrogen, g/km	0.52	0.41	0.60	0.36	0.30	0.42	0.35	0.25	0.46
Particulates									
Total Particulates	5.56	3.14	9.37	2.83	1.11	4.74	1.82	1.60	2.10
Sulfate	0.21	0.03	0.48	0.15	0.08	0.27	0.14	0.09	0.20
Sulfate as % of TFS, %	0.29	0.04	0.70	0.28	0.14	0.47	0.30	0.19	0.46
Compound Group Totals									
Aldehydes & Ketones	0.6	0.1	1.3	0.2	0.0	0.4	0.9	0.0	2.6
Individual Hydrocarbons	80.8	67.7	96.5	16.3	14.9	18.0	10.3	6.4	15.6
Organic Sulfides	0.20	0.03	0.43	0.03	0.00	0.06	0.02	0.00	0.06
Organic Amines	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02
Other Compounds									
Ammonia	11.1	8.2	16.5	--	--	--	--	--	--
Cyanide & Cyanogen	1.01	0.70	1.23	--	--	--	--	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.02	0.00	0.07	0.02	0.00	0.06	0.01	0.00	0.04
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	17.6	5.5	33.3	3.8	1.0	6.2	2.3	0.1	3.6

TABLE G-2(Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 42
1978 Pontiac Sunbird with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVMFST	42X-11			42X-12			42X-13		
Aldehydes and Ketones									
Formaldehyde	0.35	0.03	0.54	0.01	0.00	0.02	0.08	0.00	0.24
Acetaldehyde	0.06	0.00	0.18	0.00	0.00	0.00	0.67	0.00	2.01
Acetone	0.03	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.06	0.00	0.18	0.05	0.00	0.14
Methyl Ethyl Ketone	0.09	0.00	0.28	0.05	0.00	0.15	0.05	0.00	0.14
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.11	0.00	0.33	0.06	0.00	0.18	0.06	0.00	0.17
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.6	0.1	1.3	0.2	0.0	0.4	0.9	0.0	2.6
Total as % of THC, %	0.4	0.1	0.7	2.0	0.0	4.0	8.7	0.0	26.0
Individual Hydrocarbons									
Methane	31.50	23.21	40.25	13.56	12.91	14.13	8.20	0.00	10.52
Ethylene	12.47	10.74	13.65	0.36	0.00	0.74	0.41	0.00	1.31
Ethane	4.05	3.41	4.85	1.69	1.52	1.87	1.11	0.00	1.48
Acetylene	6.29	4.24	8.49	0.00	0.00	0.00	0.19	0.00	0.75
Propane	1.30	0.92	1.65	0.02	0.00	0.06	0.09	0.00	0.34
Propylene	6.11	5.31	6.67	0.00	0.00	0.00	0.10	0.00	0.40
Benzene	7.57	6.80	9.45	0.71	0.00	1.52	0.22	0.00	0.84
Toluene	11.55	10.50	12.53	0.00	0.00	0.00	0.00	0.00	0.00
Total Individual HC	80.8	67.7	96.5	16.3	14.9	18.0	10.3	6.4	15.6
Total as % of THC, %	52.2	45.1	57.9	82.3	74.6	90.0	30.8	9.1	52.5
Organic Sulfides									
Carbonyl Sulfide	0.13	0.00	0.31	0.02	0.00	0.05	0.01	0.00	0.03
Methyl Sulfide	0.05	0.00	0.12	0.01	0.00	0.02	0.01	0.00	0.03
Ethyl Sulfide	0.02	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE G-2 (Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 42
1978 Pontiac Sunbird with Three-Way Catalyst

		EMISSION RATE, MG/KM (Except at Noted)								
		FTP			SET			HFET		
		Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST		42X-11			42X-12			42X-13		
Trace Elements										
Chromium	Cr									
Lead	Pb	0.02	0.00	0.07						
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.02	0.00	0.04	0.01	0.00	0.04			
Phosphorus	P	0.01	0.00	0.02	0.01	0.00	0.02	0.00	0.00	0.01
Silicon	Si	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.01
Cadmium	Cd									
Aluminum	Al	0.02	0.01	0.03	0.01	0.00	0.03	0.00	0.00	0.01
Sulfur	S	0.02	0.01	0.04	0.05	0.02	0.11	0.04	0.02	0.05
Sodium	Na									
Fluorine	F									
Magnesium	Mg	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.04
Potassium	K									
Chlorine	Cl	0.00	0.00	0.01	0.01	0.00	0.03			
Platinum	Pt									
Zinc	Zn	0.01	0.00	0.04	0.02	0.00	0.04	0.00	0.00	0.01
Copper	Cu	0.00	0.00	0.01	0.01	0.00	0.02			
Nickel	Ni									
Iron	Fe	0.30	0.03	0.58	0.18	0.00	0.39	0.03	0.00	0.04
Vanadium	V									
Titanium	Ti									
Barium	Ba	0.02	0.01	0.03	0.03	0.01	0.06	0.02	0.01	0.02
Calcium	Ca	0.05	0.02	0.09	0.03	0.01	0.09	0.02	0.00	0.04

TABLE G-3. AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 43
1978 SAAB 99 with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST	43X-11			43X-12			43X-13		
Barometer, mm Hg	744.2	739.4	757.2	743.3	737.4	756.9	742.8	737.4	755.6
Humidity, g/kg	7.2	4.2	12.4	7.4	3.3	11.7	6.83	1.9	12.2
Temperature, °C	23.8	20.6	26.1	24.5	22.8	26.1	25.4	24.4	26.7
Total Fuel Sulfur, mg/km	23.2	22.2	23.9	20.5	20.0	21.5	18.6	18.1	19.3
Avg. Exh. Oxygen, %	1.12	0.73	1.51	0.36	0.08	0.85	0.43	0.01	1.26
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	250.0	239.3	257.1	221.5	215.9	232.3	200.7	195.0	208.9
Fuel Cons., ℓ/100 km	10.82	10.35	11.16	9.54	9.31	10.01	8.67	8.44	9.00
Regulated Emissions									
Hydrocarbons, (THC), g/km	0.10	0.07	0.13	0.03	0.01	0.04	0.04	0.02	0.04
Carbon Monoxide, g/km	2.09	1.63	2.61	1.28	0.98	1.46	1.53	1.15	1.74
Oxides of Nitrogen, g/km	0.11	0.10	0.12	0.08	0.06	0.09	0.06	0.05	0.08
Particulates									
Total Particulates	4.90	2.17	7.34	4.12	0.25	11.00	5.46	0.26	15.20
Sulfate	0.19	0.13	0.28	0.10	0.04	0.14	0.07	0.05	0.08
Sulfate as % of TFS, %	0.27	0.18	0.41	0.16	0.07	0.23	0.12	0.09	0.15
Compound Group Totals									
Aldehydes & Ketones	0.4	0.0	1.5	0.0	0.0	0.0	0.2	0.0	0.5
Individual Hydrocarbons	72.3	55.6	105.1	26.9	24.0	32.9	30.1	28.3	31.5
Organic Sulfides	0.32	0.05	0.60	0.09	0.02	0.22	0.12	0.00	0.23
Organic Amines	0.01	0.00	0.02	0.01	0.00	0.02	0.03	0.00	0.09
Other Compounds									
Ammonia	60.8	28.1	85.9	--	--	--	--	--	--
Cyanide & Cyanogen	1.09	0.48	2.24	--	--	--	--	--	--
DMNA	--	--	--	--	--	--	--	--	--
Hydrogen Sulfide	0.12	0.06	0.15	0.43	0.37	0.55	0.47	0.28	0.60
Nickel Carbonyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	11.0	8.4	12.7	5.0	2.8	7.3	3.4	2.5	4.5

TABLE G-3 (Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 43
1978 SAAB 99 with Three-Way Catalyst

	EMISSION RATE, MG/KM (Except as Noted)								
	FTP			SET			HFET		
	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVMFST	43X-11			43X-12			43X-13		
Aldehydes and Ketones									
Formaldehyde	0.09	0.00	0.34	0.00	0.00	0.00	0.07	0.00	0.27
Acetaldehyde	0.29	0.00	1.17	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.46
Benzaldehyde	--	--	--	--	--	--	--	--	--
Aldehydes and Ketones	0.4	0.0	1.5	0.00	0.0	0.0	0.2	0.0	0.5
Total as % of THC, %	0.4	0.0	1.5	0.00	0.0	0.0	0.5	0.0	1.3
Individual Hydrocarbons									
Methane	20.77	17.92	27.48	13.02	11.92	13.81	14.07	11.27	16.97
Ethylene	9.50	8.42	10.48	3.21	2.33	4.51	3.67	2.86	5.07
Ethane	3.10	2.56	3.54	2.20	1.74	2.39	2.29	2.02	2.76
Acetylene	2.57	1.40	4.15	0.04	0.00	0.16	0.00	0.00	0.00
Propane	1.56	0.00	3.77	0.50	0.06	1.10	0.20	0.05	0.35
Propylene	4.28	3.95	4.73	1.68	1.28	2.39	1.89	1.45	2.47
Benzene	19.78	6.91	55.06	4.13	2.85	5.54	4.66	3.76	5.62
Toluene	10.74	8.68	14.51	2.09	0.52	5.12	3.30	1.66	3.98
Total Individual HC	72.3	55.6	105.1	26.9	24.0	32.9	30.1	28.3	31.5
Total as % of THC, %	75.7	42.8	105.1	69.0	63.8	83.3	76.8	74.5	78.8
Organic Sulfides									
Carbonyl Sulfide	0.29	0.00	0.59	0.04	0.00	0.14	0.10	0.00	0.23
Methyl Sulfide	0.03	0.01	0.08	0.04	0.02	0.08	0.03	0.00	0.10
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.01	0.01	0.00	0.02	0.02	0.00	0.05
Monoethylamine	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.04
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE G-3 (Cont'd). AVERAGE, MINIMUM AND MAXIMUM VALUES FOR THE UNMODIFIED CONFIGURATION - CAR 43
1978 SAAB 99 With Three-Way Catalyst

		EMISSION RATE, MG/KM (Except at Noted)								
		FTP			SET			HFET		
		Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.
Test Number, PVM-ST		43X-11			43X-12			43X-13		
Trace Elements										
Chromium	Cr									
Lead	Pb	0.03		0.13				0.04		0.14
Manganese	Mn			0.01						
Arsenic	As									
Mercury	Hg									
Bromine	Br	0.02		0.05	0.02		0.05			
Phosphorus	P	0.02		0.04	0.01		0.01			
Silicon	Si	0.03	0.01	0.06	0.02	0.02	0.02	0.01		0.04
Cadmium	Cd									
Aluminum	Al	0.08	0.03	0.15	0.02	0.01	0.02	0.01		0.01
Sulfur	S	0.05	0.02	0.07	0.03	0.01	0.05	0.01		0.02
Sodium	Na			0.01						
Fluorine	F									
Magnesium	Mg	0.01		0.02	0.01		0.01			
Potassium	K									0.01
Chlorine	Cl	0.04		0.07	0.06	0.01	0.18	0.01		0.02
Platinum	Pt									
Zinc	Zn	0.03		0.07	0.01		0.02			0.01
Copper	Cu	0.01		0.03						
Nickel	Ni									
Iron	Fe	0.64	0.36	0.81	0.18	0.09	0.28	0.09	0.03	0.17
Vanadium	V									
Titanium	Ti			0.01						
Barium	Ba	0.03	0.01	0.07	0.01	0.01	0.02	0.01	0.01	0.02
Calcium	Ca	0.03	0.01	0.06	0.02	0.01	0.02	0.01		0.02

APPENDIX H

AVERAGE VALUES FOR ALL CONFIGURATIONS

TABLE H-1. CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP
1978 FORD PINTO WITH THREE-WAY CATALYST

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled O_2 & Air Pump
Test No.	PVM	41	411	412	413	415
Barometer,	mm Hg	744.9	747.4	751.6	747.8	738.4
Humidity,	g/kg	7.1	5.8	6.2	3.7	9.9
Temperature,	°C	23.8	25.3	23.1	24.2	23.6
Total Fuel Sulfur,	mg/km	23.8	25.8	24.0	25.4	24.9
Avg. Exh. Oxygen,	%	6.3	5.5	6.6	5.9	1.2
Catalyst Avg. Temp.,	°C	417.	536.*	538.	445.	394.
Catalyst Max. Temp.,	°C	560.	711.	741.	741.	487.
Carbon Dioxide,	g/km	258.3	279.1	257.6	274.2	209.0
Fuel Cons.,	ℓ/100 km	11.12	12.05	11.21	11.84	11.61
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.07	0.10	0.38	0.12	1.16
Carbon Monoxide,	g/km	1.30	1.86	2.41	1.75	37.72
Oxides of Nitrogen,	g/km	0.47	0.30	0.30	0.73	0.11
Particulates						
Total Particulates		15.3	2.9	6.5	19.7	7.5
Sulfate		3.13	1.03	0.80	12.25	0.05
Compound Group Totals						
Aldehydes & Ketones		1.1	0.7	0.0	0.5	1.3
Individual Hydrocarbons		40.6	93.6	102.4	88.4	498.1
Organic Sulfides		0.78	0.13*	0.18	0.17	0.81
Organic Amines		0.03	0.03	0.00	0.00	0.01
Other Compounds						
Ammonia		6.0	10.2	6.53*	13.2	63.3
Cyanide & Cyanogen		<0.1	--	0.1	0.0	10.1
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.01	0.00	0.00	0.00	0.75
Nickel Carbonyl		0.00	0.00	0.00	0.00	0.00
Nitrous Oxide		16.0	16.3	9.4	79.4	7.7
Aldehydes and Ketones						
Formaldehyde		0.79	0.00	0.00	0.48	0.32
Acetaldehyde		0.00	0.02	0.00	0.00	0.62
Acetone		0.04	0.14	0.00	0.00	0.00
Isobutyraldehyde		0.00	0.00	0.00	0.00	0.09
Methyl Ethyl Ketone		0.14	0.23	0.00	0.00	0.22
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.09	0.26	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-1 (Cont'd). CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP
1978 FORD PINTO WITH THREE-WAY CATALYST

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled & Air Pump
Individual Hydrocarbons					
Methane	29.46	72.05	24.65	72.11	104.70
Ethylene	2.92	3.65	7.08	2.48	134.67
Ethane	1.99	7.06	2.42	6.47	14.04
Acetylene	1.64	1.16	20.28	0.85	7.11
Propane	0.07	2.66	0.66	0.12	1.97
Propylene	0.91	1.18	2.74	0.76	54.60
Benzene	1.91	3.25	12.21	3.04	76.10
Toluene	1.73	2.60	32.30	2.56	104.88
Organic Sulfides					
Carbonyl Sulfide	0.68	0.11*	0.14	0.02	0.68
Methyl Sulfide	0.10	0.02*	0.02	0.13	0.08
Ethyl Sulfide	0.00	0.00*	0.02	0.02	0.05
Methyl Disulfide	0.00	0.00*	0.00	0.00	0.00
Organic Amines					
Monomethylamine	0.01	0.02	0.00	0.00	0.01
Monoethylamine	0.02	0.00	0.00	0.00	0.01
Trimethylamine	0.01	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese				0.02	
Phosphorus	0.01	0.01	0.02	0.02	
Silicon	0.01	0.01	0.03	0.03	0.01
Aluminum	0.04	0.03	0.08	0.05	0.01
Sulfur	2.81	1.23	0.37	2.13	0.01
Sodium			0.01	0.01	
Magnesium	0.01	0.01	0.02	0.01	0.01
Potassium				0.01	
Chlorine	0.01	0.01	0.01	0.05	0.03
Zinc	0.01	0.01	0.03	0.03	0.01
Copper	0.01			0.02	
Nickel	0.01				
Iron	0.80	0.25	2.99	7.82	0.10
Barium	0.02	0.02	0.06	0.06	0.03
Calcium	0.02	0.01	0.01	0.02	0.01

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-2. CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET
1978 FORD PINTO WITH THREE-WAY CATALYST

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled O_2 & Air Pump
Test No.	PVM	41	411	412	413	415
Barometer,	mm Hg	746.3	747.9	752.2	746.9	737.8
Humidity,	g/kg	5.8	7.5	6.2	4.8	9.5
Temperature,	°C	24.4	24.2	25.0	24.5	26.1
Total Fuel Sulfur,	mg/km	18.5	21.4	20.5	20.6	21.4
Avg. Exh. Oxygen,	%	6.0	5.4	6.0	5.3	0.8*
Catalyst Avg. Temp.,	°C	480.	614.	617.	--	487.
Catalyst Max. Temp.,	°C	546.	780.	735.	756.	557.
Carbon Dioxide,	g/km	202.5	233.1	223.6	223.1	177.2
Fuel Cons.,	ℓ/100 km	8.65	10.0	9.56	9.63	9.97
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.01	0.05	0.01	0.07	0.81
Carbon Monoxide,	g/km	0.03	0.61	0.17	1.38	34.27
Oxides of Nitrogen,	g/km	0.69	0.39	0.25	0.81	0.15
Particulates						
Total Particulates		4.9	20.4	13.9	19.5	9.4
Sulfate		2.19	13.83	4.50	3.94	0.06
Compound Group Totals						
Aldehydes & Ketones		2.4	0.6	0.0	0.0	0.3
Individual Hydrocarbons		11.2	51.5	16.0	56.8	381.4
Organic Sulfides		0.30	0.06	0.09	0.07	6.04
Organic Amines		0.01	0.05	0.00	0.01	0.01
Other Compounds						
Ammonia		--	--	--	--	--
Cyanide & Cyanogen		--	--	--	--	--
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.00	0.00	0.00	0.00	5.27
Nickel Carbonyl		0.00	0.00	0.00	0.00	0.00
Nitrous Oxide		9.4	9.3	3.3	43.4	3.1
Aldehydes and Ketones						
Formaldehyde		2.10	0.03	0.00	0.00	0.01
Acetaldehyde		0.07	0.36	0.00	0.00	0.13
Acetone		0.02	0.00	0.00	0.00	0.02
Isobutyraldehyde		0.00	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone		0.02	0.06	0.00	0.00	0.13
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.17	0.14	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-2 (Cont'd). CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET
1978 FORD PINTO WITH THREE-WAY CATALYST

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled O_2 & Air Pump
Individual Hydrocarbons					
Methane	10.46	46.40	10.41	50.98	83.93
Ethylene	0.01	0.55	0.65	0.76	96.32
Ethane	0.69	3.02	1.31	3.65	12.29
Acetylene	0.00	0.00	3.24	0.00	0.05
Propane	0.00	0.93	0.06	0.03	2.81
Propylene	0.00	0.00	0.06	0.00	45.70
Benzene	0.00	0.45	0.22	1.31	60.78
Toluene	0.04	0.00	0.00	0.06	79.53
Organic Sulfides					
Carbonyl Sulfide	0.29	0.04	0.07	0.00	5.86
Methyl Sulfide	0.02	0.02	0.03	0.07	0.07
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.10
Methyl Disulfide	0.00	0.01	0.00	0.00	0.02
Organic Amines					
Monomethylamine	0.01	0.01	0.00	0.01	0.01
Monoethylamine	0.00	0.00	0.00	0.01	0.00
Trimethylamine	0.00	0.04	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese				0.02	
Phosphorus	0.01	0.01	0.01	0.05	0.01
Silicon	0.01	0.01	0.02	0.01	0.01
Aluminum	0.02	0.02	0.04	0.02	0.01
Sulfur	1.07	5.51	3.29	6.77	0.02
Sodium				0.01	
Magnesium	0.01		0.01	0.03	0.01
Potassium					
Chlorine	0.03			0.10	0.14
Zinc	0.02	0.01	0.02	0.16	0.01
Copper	0.01			0.02	
Nickel					
Iron	0.17	0.10	1.24	2.04	0.07
Barium	0.02	0.01	0.04	0.08	0.03
Calcium	0.01		0.01	0.01	0.02

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-3. CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET
1978 FORD PINTO WITH THREE-WAY CATALYST

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled O_2 & Air Pump
Test No.	PVM	41	411	412	413	415
Barometer,	mm Hg	746.2	747.0	751.6	746.9	738.9
Humidity,	g/kg	6.8	7.2	5.1	4.8	9.0
Temperature,	°C	25.3	25.0	20.9	25.3	25.6
Total Fuel Sulfur,	mg/km	16.9	20.5	18.3	18.5	20.2
Avg. Exh. Oxygen,	%	5.3	4.2	4.9	4.3	0.2
Catalyst Avg. Temp.,	°C	515.	702.	678.	--	535.
Catalyst Max. Temp.,	°C	555.	799.	754.	767.	563.
Carbon Dioxide,	g/km	184.3	223.4	199.6	200.4	159.5
Fuel Cons.,	ℓ/100 km	7.87	9.57	8.53	8.62	9.42
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.01	0.04	0.01	0.95	0.83
Carbon Monoxide,	g/km	0.03	0.45	0.07	0.88	37.24
Oxides of Nitrogen,	g/km	0.75	0.39	0.11	0.84	0.14
Particulates						
Total Particulates		13.8	10.3	12.6	5.9	3.8
Sulfate		7.05	9.77	5.46	9.37	0.06
Compound Group Totals						
Aldehydes & Ketones		3.0	0.8	0.0	0.0	0.4
Individual Hydrocarbons		5.8	42.4	15.2	44.1	378.4
Organic Sulfides		0.14	0.06	0.10	0.24	4.56
Organic Amines		0.00	0.03	0.02	0.03	0.02
Other Compounds						
Ammonia		--	--	--	--	--
Cyanide & Cyanogen		--	--	--	--	--
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.00	0.00	0.00	0.00	6.32
Nickel Carbonyl		0.00	0.00	0.00	0.00	0.00
Nitrous Oxide		6.1	4.0	1.4	20.4	1.1
Aldehydes and Ketones						
Formaldehyde		2.64	0.21	0.00	0.00	0.07
Acetaldehyde		0.00	0.21	0.00	0.00	0.18
Acetone		0.03	0.00	0.00	0.00	0.00
Isobutyraldehyde		0.15	0.00	0.00	0.00	0.00
Methyl Ethyl Ketone		0.11	0.10	0.00	0.00	0.18
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.04	0.21	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-3 (Cont'd). CAR 41 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET
1978 FORD PINTO WITH THREE-WAY CATALYST

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	Disabled O_2 & Air Pump
Individual Hydrocarbons					
Methane	5.55	38.87	12.05	40.26	81.75
Ethylene	0.03	0.89	0.90	0.68	95.78
Ethane	0.20	1.84	1.30	2.39	11.32
Acetylene	0.00	0.00	0.48	0.00	0.08
Propane	0.00	0.52	0.09	0.05	1.21
Propylene	0.02	0.00	0.08	0.04	46.67
Benzene	0.00	0.22	0.24	0.64	60.50
Toluene	0.00	0.00	0.02	0.00	80.94
Organic Sulfides					
Carbonyl Sulfide	0.08	0.03	0.08	0.00	4.37
Methyl Sulfide	0.06	0.02	0.02	0.24	0.07
Ethyl Sulfide	0.00	0.01	0.00	0.00	0.13
Methyl Disulfide	0.00	0.01	0.00	0.00	0.00
Organic Amines					
Monomethylamine	0.00	0.01	0.01	0.01	0.01
Monoethylamine	0.00	0.00	0.01	0.01	0.01
Trimethylamine	0.00	0.02	0.00	0.02	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.03	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese					
Phosphorus	0.01	0.01	0.01	0.01	
Silicon		0.01			
Aluminum	0.01	0.03	0.02	0.01	
Sulfur	3.93	2.53	4.54	5.84	0.02*
Sodium					
Magnesium		0.01	0.01	0.01	
Potassium					
Chlorine	0.01				0.03*
Zinc		0.01	0.01	0.02	0.02*
Copper					
Nickel					
Iron	0.07	0.10	0.25	1.00	0.04*
Barium	0.01	0.02	0.02	0.02	0.02*
Calcium	0.01			0.01	0.02*

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-4. CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Test No.	PVM	42	421	422	423	424
Barometer,	mm Hg	748.7	741.7	739.8	737.5	744.0
Humidity,	g/kg	6.5	9.85	11.9	8.20	9.7
Temperature,	°C	23.8	23.1	24.7	25.55	22.5
Total Fuel Sulfur,	mg/km	23.3	27.3	23.4	26.2	24.19
Avg. Exh. Oxygen,	%	1.5	0.9*	1.4	1.8	1.0
Catalyst Avg. Temp.,	°C	407.	356.*	541.*	350.	372.*
Catalyst Max. Temp.,	°C	502.	421.	618.	423.	478.
Carbon Dioxide,	g/km	250.6	202.9	245.4	191.7	259.1
Fuel Cons.,	ℓ/100 km	10.89	12.72	10.94	12.23	11.29
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.16	1.47	1.05	1.40	0.24
Carbon Monoxide,	g/km	2.60	57.50	4.71	47.58	2.95
Oxides of Nitrogen,	g/km	0.52	0.13	0.37	0.16	0.58
Particulates						
Total Particulates		5.6	11.1	7.5	28.7	6.0
Sulfate		0.21	0.32	0.16	0.12	0.20
Compound Group Totals						
Aldehydes & Ketones		0.6	3.8	1.2	6.4	0.4*
Individual Hydrocarbons		80.8	751.1	234.0	690.9	98.3
Organic Sulfides		0.20	1.37	--	0.54	0.14
Organic Amines		0.00	0.02	0.00	0.02	0.00
Other Compounds						
Ammonia		11.1	68.1	36.7	93.9	
Cyanide & Cyanogen		1.01	4.13	4.09	6.97	5.40
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.02	1.06	0.07	0.56	0.03
Nickel Carbonyl		0.00	0.00	0.00	0.00*	--
Nitrous Oxide		17.6	3.5	10.9	3.6	27.5
Aldehydes and Ketones						
Formaldehyde		0.35	0.74	0.39	1.68	0.18
Acetaldehyde		0.06	2.01	0.76	4.70	0.00
Acetone		0.03	0.40	0.05	0.00	0.03
Isobutyraldehyde		0.00	0.00	0.00	0.00	--
Methyl Ethyl Ketone		0.09	0.26	0.00	0.00	0.00
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.11	0.36	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-4 (Cont'd). CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Individual Hydrocarbons					
Methane	31.50	186.09	37.32	167.54	30.75
Ethylene	12.47	215.05	22.53	185.24	16.56
Ethane	4.05	17.47	5.86	14.82	5.29
Acetylene	6.29	12.76	18.64	24.98	6.29
Propane	1.30	1.97	1.36	1.51	3.25
Propylene	6.11	79.28	13.08	69.08	8.23
Benzene	7.57	96.18	39.39	97.83	10.03
Toluene	11.55	142.33	95.83	129.93	17.90
Organic Sulfides					
Carbonyl Sulfide	0.13	1.32	--	0.54	0.05
Methyl Sulfide	0.05	0.04	--	0.00	0.04
Ethyl Sulfide	0.02	0.02	--	0.00	0.05
Methyl Disulfide	0.00	0.00	--	0.00	0.01
Organic Amines					
Monomethylamine	0.00	0.02	0.00	0.02	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.01	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese					
Phosphorus	0.01	0.01	0.01	0.01	0.11*
Silicon	0.01		0.01	0.03	0.01*
Aluminum	0.02	0.02	0.03	0.02	0.01*
Sulfur	0.02	0.03	0.04	0.04	0.02*
Sodium					0.01*
Magnesium	0.01	0.01	0.01	0.01	0.07*
Potassium				0.01	
Chlorine		0.01	0.01	0.01	0.11*
Zinc	0.01	0.03	0.02	0.02	0.10*
Copper			0.01		
Nickel					
Iron	0.30	0.25	0.39	0.15	0.14*
Barium	0.02	0.03	0.03	0.04	0.22*
Calcium	0.05	0.02	0.06	0.10	0.01*

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-5. CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Test No. PVM	42	421	422	423	424
Barometer, mm Hg	749.4	741.2	739.7	736.8	742.6
Humidity, g/kg	8.6	9.8	10.2	7.7	8.4
Temperature, °C	24.9	23.9	26.2	25.9	23.9
Total Fuel Sulfur, mg/km	18.3	21.9	19.5	21.0	18.12
Avg. Exh. Oxygen, %	1.2	0.5	0.7	1.0	0.8
Catalyst Avg. Temp., °C	532.	425.	630.	458.	489.
Catalyst Max. Temp., °C	617.	521.	745.	529.	576.
Carbon Dioxide, g/km	199.0	166.0	206.8	157.5	197.3
Fuel Cons., ℓ/100 km	8.53	10.24	9.09	9.82	8.46
Regulated Emissions					
Hydrocarbons (THC), g/km	0.02	0.99	0.25	0.89	0.03
Carbon Monoxide, g/km	0.56	44.97	3.34	44.42	0.47
Oxides of Nitrogen, g/km	0.36	0.06	0.10	0.06	0.48
Particulates					
Total Particulates	2.83	9.84	2.45	17.79	3.89
Sulfate	0.15	0.20	0.10	0.06	0.13
Compound Group Totals					
Aldehydes & Ketones	0.2	1.5	0.1	3.4	0.3
Individual Hydrocarbons	16.3	528.5	42.6	476.8	22.2
Organic Sulfides	0.03	0.97	--	0.51	0.03
Organic Amines	0.00	0.00	0.00	0.03	0.01
Other Compounds					
Ammonia	--	--	--	--	--
Cyanide & Cyanogen	--	--	--	--	--
DMNA	--	--	--	--	--
Hydrogen Sulfide	0.02	2.08	0.13	1.72	0.00
Nickel Carbonyl	0.00	0.00	0.00	0.00*	------
Nitrous Oxide	3.8	1.7	1.2	1.0	6.0
Aldehydes and Ketones					
Formaldehyde	0.01	0.17	0.00	0.52	0.07
Acetaldehyde	0.00	0.86	0.00	2.80	0.00
Acetone	0.00	0.12	0.00	0.00	0.20
Isobutyraldehyde	0.06	0.00	0.09	0.00	0.00
Methyl Ethyl Ketone	0.05	0.13	0.00	0.00	0.00
Crotonaldehyde	--	--	--	--	--
Hexanaldehyde	0.06	0.18	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--

TABLE H-5 (Cont'd). CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Individual Hydrocarbons					
Methane	13.56	124.88	22.34	114.00	17.50
Ethylene	0.36	147.45	1.75	126.35	0.51
Ethane	1.69	13.62	5.84	11.75	2.63
Acetylene	0.00	0.27	0.00	0.13	0.00
Propane	0.02	1.07	0.98	1.15	0.22
Propylene	0.00	61.67	5.22	53.17	0.15
Benzene	0.71	76.23	5.32	78.46	0.84
Toluene	0.00	103.32	1.18	91.77	0.30
Organic Sulfides					
Carbonyl Sulfide	0.02	0.91	--	0.46	0.02
Methyl Sulfide	0.01	0.03	--	0.05	0.02
Ethyl Sulfide	0.00	0.04	--	0.01	0.00
Methyl Disulfide	0.00	0.00	--	0.00	0.00
Organic Amines					
Monomethylamine	0.00	0.00	0.00	0.02	0.01
Monoethylamine	0.00	0.00	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese				0.01	
Phosphorus	0.01	0.01	0.01	0.03	0.10*
Silicon			0.01	0.03	0.01*
Aluminum	0.01	0.02	0.01	0.04	0.01*
Sulfur	0.05	0.02	0.04	0.05	0.04*
Sodium				0.01	0.02*
Magnesium	0.01	0.01	0.01	0.02	0.07*
Potassium				0.01	
Chlorine	0.01	0.02	0.03	0.02	0.21*
Zinc	0.02	0.03	0.02	0.04	0.11*
Copper	0.01				
Nickel					
Iron	0.18	0.20	0.23	0.35	0.38*
Barium	0.03	0.03	0.02	0.06	0.22*
Calcium	0.03	0.02	0.03	0.14	0.02*

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-6. CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Test No.	PVM	42	421	422	423	424
Barometer,	mm Hg	749.1	741.2	739.7	736.8	744.0
Humidity,	g/kg	8.1	9.6	10.2	6.5	7.7
Temperature,	°C	25.0	23.6	25.9	27.0	23.1
Total Fuel Sulfur,	mg/km	15.7	19.9	17.7	17.4	17.15
Avg. Exh. Oxygen,	%	0.4	0.05*	0.3	0.9	0.41
Catalyst Avg. Temp.,	°C	596.	491.	711.*	510.	573.
Catalyst Max. Temp.,	°C	627.	540.	756.*	546.	599.
Carbon Dioxide,	g/km	171.1	151.4	188.6	129.4	187.0
Fuel Cons.,	ℓ/100 km	7.32	9.29	8.26	8.12	8.00
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.03	0.83	0.16	0.72	0.01
Carbon Monoxide,	g/km	0.21	40.5	2.87	37.23	0.30
Oxides of Nitrogen,	g/km	0.35	0.04	0.05	0.04	0.53
Particulates						
Total Particulates		1.82	8.13	1.26	16.65	0.51*
Sulfate		0.28	0.21	0.05	0.11	0.20
Compound Group Totals						
Aldehydes & Ketones		0.9	2.8	0.1	2.1	0.2
Individual Hydrocarbons		10.3	438.1	33.9	379.5	18.3
Organic Sulfides		0.02	0.88	-----	1.14	0.07
Organic Amines		0.01	0.00	0.00	0.02	0.01
Other Compounds						
Ammonia		--	--		--	--
Cyanide & Cyanogen		--	--		--	--
DMNA		--	--		--	--
Hydrogen Sulfide		0.01	2.94	0.17	2.03	0.00
Nickel Carbonyl		0.00	0.00	0.00	0.00	--
Nitrous Oxide		2.3	0.4	1.2	0.5	3.42
Aldehydes and Ketones						
Formaldehyde		0.08	0.35	0.00	0.68	0.10
Acetaldehyde		0.67	1.53	0.00	1.36	0.03
Acetone		0.00	0.47	0.00	0.00	0.02
Isobutyraldehyde		0.05	0.00	0.07	0.00	0.00
Methyl Ethyl Ketone		0.05	0.13	0.00	0.00	0.00
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.06	0.28	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-6 (Cont'd). CAR 42 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	Disabled EGR & O_2	High Oil Consumption
Individual Hydrocarbons					
Methane	8.20	102.60	14.62	91.24	14.46
Ethylene	0.41	110.87	4.62	91.19	0.94
Ethane	1.11	11.74	3.81	9.95	2.01
Acetylene	0.19	0.04	0.00	0.13	0.00
Propane	0.09	1.25	0.32	0.87	0.00
Propylene	0.10	51.49	5.58	41.62	0.11
Benzene	0.22	71.11	3.05	69.08	0.64
Toluene	0.00	88.97	1.93	75.44	0.13
Organic Sulfides					
Carbonyl Sulfide	0.01	0.85	--	1.08	0.02
Methyl Sulfide	0.01	0.02	--	0.04	0.02
Ethyl Sulfide	0.00	0.02	--	0.01	0.03
Methyl Disulfide	0.00	0.00	--	0.02	0.01
Organic Amines					
Monomethylamine	0.01	0.00	0.00	0.02	0.01
Monoethylamine	0.00	0.00	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese					
Phosphorus			0.01	0.01	0.05*
Silicon					
Aluminum				0.01	
Sulfur	0.04	0.01	0.01	0.01	0.04*
Sodium					
Magnesium	0.01				0.04*
Potassium					
Chlorine				0.01	0.11*
Zinc		0.01	0.01		0.03*
Copper		0.02			
Nickel					
Iron	0.03	0.01	0.02	0.02	
Barium	0.02	0.02	0.02	0.02	0.13*
Calcium	0.02	0.01		0.01	

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-7. CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consump.	Disabled O_2+R.B.I.
Test No.	PVM	43	431	432	434	436
Barometer,	mm Hg	744.2	745.7	748.9	740.1	749.5
Humidity,	g/kg	7.2	7.9	4.5	10.7	2.9
Temperature,	°C	23.8	24.2	23.9	24.2	22.2
Total Fuel Sulfur,	mg/km	23.2	24.9	27.8	25.3	24.4
Avg. Exh. Oxygen,	%	1.1	0.5	0.7	0.8	1.1*
Catalyst Avg. Temp.,	°C					
Catalyst Max. Temp.,	°C					
Carbon Dioxide,	g/km	250.0	238.0	279.8	272.2	217.4
Fuel Cons.,	ℓ/100 km	10.82	11.60	12.98	11.79	11.37
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.10	0.71	2.15	0.13	0.82
Carbon Monoxide,	g/km	2.09	19.99	11.08	2.31	29.47
Oxides of Nitrogen,	g/km	0.11	0.22	0.09	0.14	0.14
Particulates						
Total Particulates		4.9	8.9	17.1	6.4	12.3
Sulfate		0.19	0.40	0.31*	0.11	0.18
Compound Group Totals						
Aldehydes & Ketones		0.4	0.4	0.0	0.6	2.8
Individual Hydrocarbons		72.3	404.0	472.5	72.7*	414.9
Organic Sulfides		0.32	--	0.71*	0.11	3.23
Organic Amines		0.01	0.04	0.01	0.01	0.04
Other Compounds						
Ammonia		60.8	260.5	142.5	63.3	318.1
Cyanide & Cyanogen		1.1	66.9	7.5	5.5	36.7
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.12	2.89	1.22	0.14	5.59
Nickel Carbonyl		0.00	0.00	0.00*	0.00	0.00
Nitrous Oxide		11.0	23.1	2.9	8.9	10.0
Aldehydes and Ketones						
Formaldehyde		0.09	0.00	0.00	0.01	0.27
Acetaldehyde		0.29	0.00	0.00	0.29	2.47
Acetone		0.00	0.24	0.00	0.00	0.08
Isobutyraldehyde		0.00	0.17	0.00	0.02	0.00
Methyl Ethyl Ketone		0.00	0.00	0.00	0.24	0.00
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.00	0.00	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-7 (Cont'd). CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consump.	Disabled O_2+ R.B.I.
Individual Hydrocarbons					
Methane	20.77	78.52	83.00	23.69	93.18
Ethylene	9.50	114.43	64.76	12.13	113.03
Ethane	3.10	15.35	20.16	3.55	13.12
Acetylene	2.57	2.19	3.04	2.23	1.97
Propane	1.56	0.80	2.36	0.32*	1.60*
Propylene	4.28	55.25	61.26	5.95	51.72
Benzene	19.78	59.93	99.40	8.07	50.53
Toluene	10.74	77.57	138.51	9.66	84.46
Organic Sulfides					
Carbonyl Sulfide	0.29	--	0.71*	0.07	3.09
Methyl Sulfide	0.03	--	0.00*	0.04	0.07
Ethyl Sulfide	0.00	--	0.00*	0.00	0.07
Methyl Disulfide	0.00	--	0.00*	0.00	0.00
Organic Amines					
Monomethylamine	0.01	0.03	0.01	0.01	0.03
Monoethylamine	0.00	0.01	0.01	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese			0.01		
Phosphorus	0.02		0.02	0.15	0.01
Silicon	0.03	0.01*	0.08	0.02	0.02
Aluminum	0.08	0.02*	0.17	0.06	0.04
Sulfur	0.05	0.03*	0.14	0.05	0.05
Sodium			0.02	0.03	0.01
Magnesium	0.01		0.02	0.10	
Potassium					0.01
Chlorine	0.04		0.02	0.43	0.01
Zinc	0.03	0.01*	0.04	0.15	0.01
Copper	0.01			0.02	
Nickel					
Iron	0.64	0.34*	2.71	0.58	0.40
Barium	0.03	0.01*	0.05	0.32	0.02
Calcium	0.03	0.02*	0.07	0.03	0.03

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-8. CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

		Average Emission Rate, mg/km (Except as Noted)				
		Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consump.	Disabled O_2+ R.B.I.
Test No.	PVM	43	431	432	434	436
Barometer,	mm Hg	743.3	744.9	750.5	741.7	749.6
Humidity,	g/kg	7.4	8.1	4.8	10.6	3.6
Temperature,	°C	24.5	23.9	23.9	27.0	23.6
Total Fuel Sulfur,	mg/km	20.5	22.0	23.5	21.4	22.5
Avg. Exh. Oxygen,	%	0.36	0.3	0.3*	0.4	0.5
Catalyst Avg. Temp.,	°C	570.	522.	711.*	634.	575.
Catalyst Max. Temp.,	°C	709.	--	818.*	748.	693.
Carbon Dioxide,	g/km	221.5	200.8	234.1	231.2	198.0
Fuel Cons.,	ℓ/100 km	9.54	10.27	10.86	9.97	10.50
Regulated Emissions						
Hydrocarbons (THC),	g/km	0.03	0.62	1.60	0.06	0.67
Carbon Monoxide,	g/km	1.28	24.10	9.73	1.42	29.27
Oxides of Nitrogen,	g/km	0.08	0.23	0.07	0.12	0.17
Particulates						
Total Particulates		4.1	1.8	9.2	4.3	2.0
Sulfate		0.10	0.10	0.16	0.12	0.14
Compound Group Totals						
Aldehydes & Ketones		0.0	0.3	4.2	0.2	0.4
Individual Hydrocarbons		26.9	371.0	462.6	35.0*	350.5
Organic Sulfides		0.09	--	0.61*	0.04	3.90
Organic Amines		0.01	0.05	0.01	0.04	0.04
Other Compounds						
Ammonia		--	--	--	--	--
Cyanide & Cyanogen		--	--	--	--	--
DMNA		--	--	--	--	--
Hydrogen Sulfide		0.43	4.20	1.05	0.31	6.78
Nickel Carbonyl		0.00	0.00	0.00*	0.00	0.00
Nitrous Oxide		5.0	8.3	1.0	4.8	4.4
Aldehydes and Ketones						
Formaldehyde		0.00	0.00	0.61	0.01	0.00
Acetaldehyde		0.00	0.00	1.92	0.11	0.35
Acetone		0.00	0.00	1.67	0.00	0.00
Isobutyraldehyde		0.00	0.28	0.00	0.00	0.00
Methyl Ethyl Ketone		0.00	0.00	0.00	0.10	0.00
Crotonaldehyde		--	--	--	--	--
Hexanaldehyde		0.00	0.00	0.00	0.00	0.00
Benzaldehyde		--	--	--	--	--

TABLE H-8 (Cont'd). CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consump.	Disabled O_2+ R.B.I.
Individual Hydrocarbons					
Methane	13.02	72.25	79.19	15.50	65.68
Ethylene	3.21	107.33	91.00	4.24	100.79
Ethane	2.20	13.89	25.24	2.48	12.44
Acetylene	0.04	0.31	0.78	0.54	0.80
Propane	0.50	1.07	2.48	0.26	1.15
Propylene	1.68	52.94	88.24	2.61	49.84
Benzene	4.13	54.99	69.15	4.77	44.46
Toluene	2.09	68.25	106.44	3.51	70.72
Organic Sulfides					
Carbonyl Sulfide	0.04	--	0.61*	0.02	3.65
Methyl Sulfide	0.04	--	0.00*	0.02	0.17
Ethyl Sulfide	0.00	--	0.00*	0.01	0.09
Methyl Disulfide	0.00	--	0.00*	0.00	0.00
Organic Amines					
Monomethylamine	0.01	0.04	0.01	0.03	0.04
Monoethylamine	0.00	0.01	0.00	0.01	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese					
Phosphorus	0.01		0.01	0.17	0.01
Silicon	0.02	0.02	0.03	0.01	0.01
Aluminum	0.02	0.01	0.05	0.03	0.02
Sulfur	0.03	0.02	0.08	0.05	0.04
Sodium			0.01	0.04	
Magnesium	0.01	0.01	0.01	0.11	0.01
Potassium					
Chlorine	0.06	0.01	0.01	0.59	0.01
Zinc	0.01	0.01	0.02	0.17	0.01
Copper				0.01	
Nickel					
Iron	0.18	0.15	0.73	0.24	0.15
Barium	0.01	0.01	0.02	0.33	0.01
Calcium	0.02	0.02	0.04	0.02	0.01

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.

TABLE H-9. CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consumption	Disabled O_2 + R.B.I.
Test No. PVM	43	431	432	434	436
Barometer, mm Hg	742.8	744.9	750.1	739.0	749.2
Humidity, g/kg	6.83	7.3	5.0	10.2	3.7
Temperature, °C	25.4	25.6	23.9	26.4	24.2
Total Fuel Sulfur, mg/km	18.6	20.3	23.3	19.8	19.2
Avg. Exh. Oxygen, %	0.43	<0.1	0.2	0.1*	0.1
Catalyst Avg. Temp., °C	665.	556.*	758.*	702.*	622.
Catalyst Max. Temp., °C	736.	638.*	827.*	767.	693.
Carbon Dioxide, g/km	200.7	182.5	204.5	213.3	173.3
Fuel Cons., ℓ/100 km	8.67	9.48	9.56	9.22	9.20
Regulated Emissions					
Hydrocarbons (THC), g/km	0.04	0.59	1.44	0.06	0.54
Carbon Monoxide, g/km	1.53	24.01	9.36	1.60	25.78
Oxides of Nitrogen, g/km	0.06	0.19	0.06	0.07	0.15
Particulates					
Total Particulates	5.5	1.5	8.2	1.1	3.0
Sulfate	0.07	0.07	0.05*	0.07	0.04
Compound Group Totals					
Aldehydes & Ketones	0.2	0.5	0.9	0.6	0.0
Individual Hydrocarbons	30.1	362.2	470.9	37.4	315.9
Organic Sulfides	0.12	--	0.48*	0.05	3.50
Organic Amines	0.03	0.03	0.03	0.04	0.04
Other Compounds					
Ammonia	--	--	--	--	--
Cyanide & Cyanogen	--	--	--	--	--
DMNA	--	--	--	--	--
Hydrogen Sulfide	0.47	4.91	1.13	0.51	6.41
Nickel Carbonyl	0.00	0.00	0.00*	0.00	0.00
Nitrous Oxide	3.4	5.1	0.7	2.8	3.5
Aldehydes and Ketones					
Formaldehyde	0.07	0.00	0.00	0.02	0.00
Acetaldehyde	0.00	0.26	0.83	0.37	0.00
Acetone	0.00	0.26	0.00	0.03	0.00
Isobutyraldehyde	0.01	0.00	0.00	0.04	0.00
Methyl Ethyl Ketone	0.12	0.00	0.00	0.12	0.00
Crotonaldehyde	--	--	--	--	--
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00
Benzaldehyde	--	--	--	--	--

TABLE H-9 (Cont'd). CAR 43 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)				
	Unmod.	Disabled O_2 Sensor	12% Misfire	High Oil Consump.	Disabled O_2+ R.B.I.
Individual Hydrocarbons					
Methane	14.07	70.18	78.11	16.69	66.49
Ethylene	3.67	106.83	103.06	4.60	89.20
Ethane	2.29	13.81	26.24	2.72	11.51
Acetylene	0.00	0.47	1.41	0.31	0.67
Propane	0.20	0.99	2.45	0.22	0.99
Propylene	1.89	53.83	99.64	2.72	44.43
Benzene	4.66	50.65	63.93	5.58	38.62
Toluene	3.30	65.40	96.11	4.55	59.93
Organic Sulfides					
Carbonyl Sulfide	0.10	--	0.48*	0.03	3.45
Methyl Sulfide	0.03	--	0.00*	0.02	0.01
Ethyl Sulfide	0.00	--	0.00*	0.00	0.04
Methyl Disulfide	0.00	--	0.00*	0.00	0.00
Organic Amines					
Monomethylamine	0.02	0.02	0.02	0.02	0.04
Monoethylamine	0.02	0.01	0.01	0.02	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00
Trace Elements [a]					
Manganese					
Phosphorus			0.01	0.10	
Silicon	0.01	0.01	0.05		
Aluminum	0.01		0.05		0.01
Sulfur	0.01	0.02	0.03	0.02	0.02
Sodium			0.01	0.01	
Magnesium			0.02	0.07	
Potassium					
Chlorine	0.01		0.01	0.29	0.01
Zinc			0.01	0.06	
Copper			0.02		
Nickel					
Iron	0.09	0.08	0.53	0.05	0.09
Barium	0.01	0.01	0.02	0.20	
Calcium	0.01	0.01	0.06	0.02	0.01

*Validity of the average value given is questionable.

[a] This table excludes lead, bromine and all elements having measured emissions values consistently below 0.01 mg/km.